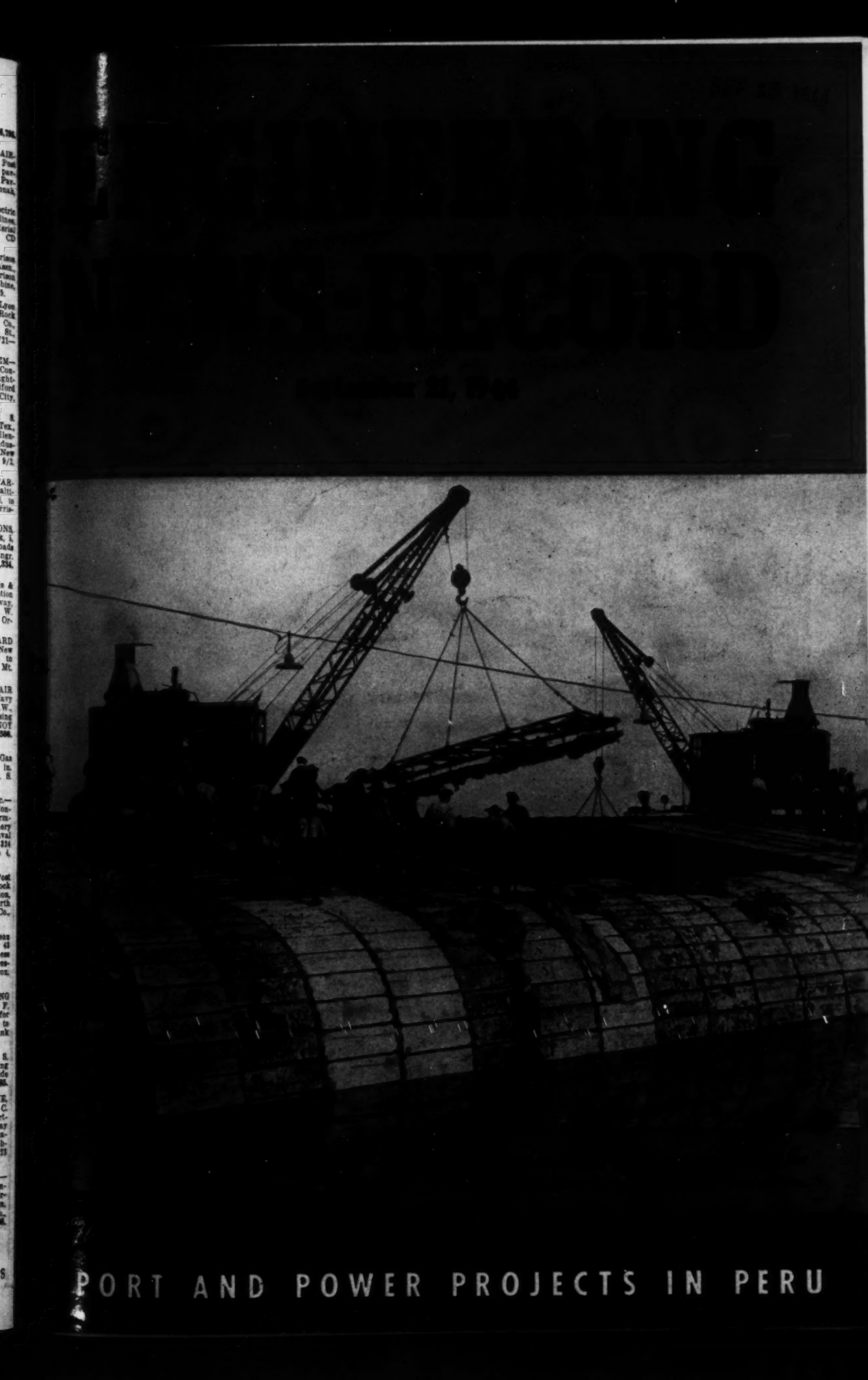
PORT AND POWER PROJECTS IN PERU

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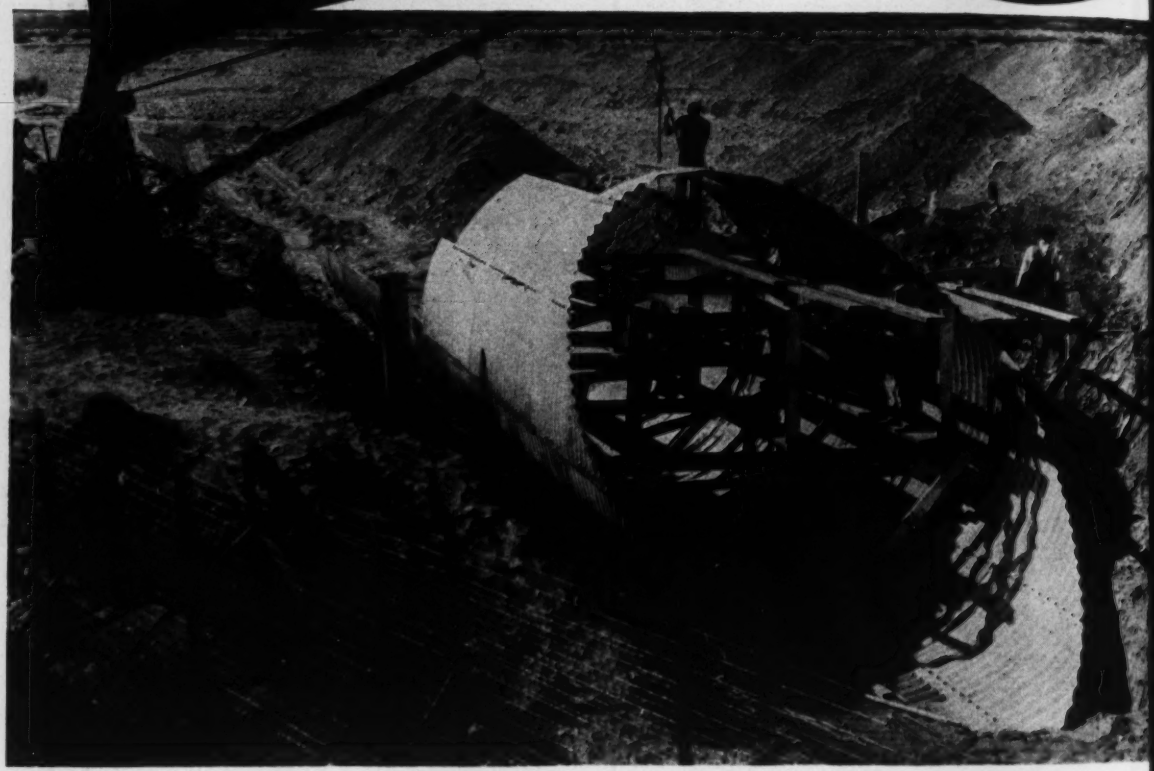

Erecting a "packaged" culvert, 165 inches in diameter.

Just as shipbuilding methods have been revolutionized by prefabrication and other time-saving methods, so will post-war construction be simplified and speeded by product manufacturers and contractors. One of these practical ideas is the "packaging" of small bridges and large sewers.

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Publication Office: 99-129 North Broadway, Albany 1, N. Y. • Editorial and Executive Offices, 330 West 42nd Street, New York 18

JOHN ABBINK, *Publisher*

WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Manager*

Vol. 133 SEPTEMBER 21, 1944 No. 12

COMING NEXT

• Use of the Navy's steel pontoon cells for bridge construction in the Pacific constitutes an interesting engineering feat. In the Solomon Islands, for example, four parallel strings of 5 x 5 x 7-ft. cells were floated to the site and lifted into place by cranes to form a 75-ft. span. An 81-ft. span, three cells wide, was erected by bold and spectacular cantilevering. Details will be published in the Oct. 5 issue.

• Articles in the Oct. 5 issue of special interest to sanitary engineers include: Problems encountered in Peru by U. S. Army Sanitary Corps engineers in providing water supply, sewage disposal, malaria control, drainage and hospital facilities; a description of a war-inspired sewage disposal plant that can be used effectively in peacetime; a new graphical method for more rapid and accurate flow calculations in egg-shaped sewers; and a brief analysis of sanitation needs in the United States.

• Everything from tin cans to old bedsprings was found during removal and disposal of 150,000 cu. yd. of spoil for a depressed section of the Detroit Industrial Expressway. Earth slides, sloughing of material in open cuts, and excessive ground water further complicated construction. Detours and "shoofly tracks" to carry heavy traffic around nine railroad and highway underpasses were required. The methods used in overcoming these difficulties will be described in *ENR* for Oct. 5.

LOOKING AHEAD

• Elimination of roof supports to provide large covered areas without interior obstructions has long been a goal of structural designers. Recent test on a 12-ft. dia. model indicate that construction of a 300-ft. dia. building without interior columns, and with a roof of 22-gage steel sheets supported by air pressure of 20 psf. is possible. Neither unsymmetrical loading nor wind tunnel tests disclosed undesirable features. A report on this test will be published in an early issue. Likewise, a description of an air supported roof for a 70,000 bu. grain storage building erected in 1934 will be included.

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Number of copies of this issue printed: 36,038

DO YOU WANT AN INDEX?

Due to the paper shortage, no index for the volume just completed, No. 132 (January-June, 1944) will be issued except to subscribers who ask for it. If you want a copy of the index please send in the coupon below. The index is now ready for distribution.

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HIGHWAYS

Illinois—Chicago—Archer Ave.—1941—Illinois Division of Highways—Contractor, John A. McGarry Co.

Illinois—Chicago—Pulaski Road—1943—Illinois Division of Highways—Contractor, Ready Coal & Construction Co.

Michigan—Muskegon—1943-44—Michigan State Highway Department—Contractor, Vinton Construction Co.

Minnesota—Nicollet County—Trunk Highway #14—1940—Minnesota State Highway Department—Contractor, Okes Construction Co.

Minnesota—Marshall County—Trunk Highway #25—1941—Minnesota State Highway Department—Contractor, Okes Construction Co.

Minnesota—Todd County—Trunk Highway #10—1941—Minnesota State Highway Department—Contractor, Western Contracting Corp.

New York—Rhinecliff—State Highway RC 4016—1939—Department of Public Works—Contractor, John Arborio, Inc.

NewYork—Valley Falls—State Highway FA-RC 40-16,—1940—Department of Public Works—Contractor, Fitzgerald Bros. Construction Co., Inc.

Ohio—Akron—Access Road 991—1943—Ohio State Highway Department—Contractor, Thorpe Construction Co.

Ohio—Cleveland—Bulkey Blvd. Grade Separation—1943—Ohio State Highway Department—Contractor, National Engineering & Contracting Co.

Ohio—Columbiana County—State Highway Route 165—1943—Ohio State Highway Department—Contractor, G. B. & C. H. Patterson.

Ohio—Allen County—Federal Aid Projects DA-WI-9A, 9B and 24A—1943—Ohio State Highway Department—Contractor, Churchill Bros. Co.

Ohio—Lorain County—State Highway Route 611, Section A—1943—Ohio State Highway Department—Contractor, Dandrea, Nardini & Falbo.

Ohio—Huron County—State Highway Route 18—1943—Ohio State Highway Department—Contractor, A. J. Baltes, Inc.

Ohio—Lorain and Medina Counties—State Highway Route 18—1943—Ohio State Highway Department—Contractor, A. J. Baltes, Inc.

Ohio—Portage County—State Highway Route 5—1943—Ohio State Highway Department—Contractor, W. M. Brode Company.

Ohio—Van Wert County—State Highway Route 418—1943—Ohio State Highway Department—Contractor: J. A' Ross & Co.

Ohio—Columbiana County—State Highway Route 14—1943—Ohio State Highway Department—Contractor, Frantz Bros.

STREETS

Akron, Ohio—Market St.—1943—City of Akron—Contractor, Thorpe Construction Co.

Appleton, Wisc.—Lawrence St.—1940—City Engineer—Contractor, Holz & Bass.

Chicago, Ill.—76th St.—1943—Chicago Department of Public Works & Buildings—Contractor, Calumet Coal Co.

Chicago, Ill.—S. Union Ave.—1943—Chicago Department of Public Works & Buildings—Contractor, Chatham Paving Co.

Lorain, Ohio—W. 21st St.—1943—City of Lorain—Contractor, Dandrea & Falbo.

Milwaukee, Wisc.—N. 45th St.—1939—Superintendent Streets, Construction & Repairs—Contractor, Bodeman Construction Co.

Milwaukee, Wisc.—Blue Mound Road—1939—Superintendent Streets, Construction & Repairs—Contractor, Bodeman Construction Co.

Minneapolis, Minn.—2nd Ave. N.—1939—City of Minneapolis—City forces.

Minneapolis, Minn.—E. Franklin Ave.—1939—City of Minneapolis—City forces.

St. Louis, Mo.—17th St.—1943—City Engineer—Contractor, Eyermann Contracting Co.

St. Louis, Mo.—Subdivision development—1943—Contractor, Guy Curry.

South Bend, Ind.—Pleasant St.—1939—City Engineer—WPA labor.

AIRPORTS

Douglas Aircraft Corp.—Park Ridge, Ill.—1942-43—U. S. Engineers—Contractor, Standard Paving Co., White Consolidated Inc., Thomas McQueen Co.

Grenier Field—Manchester, N. H.—1942-43—U. S. Engineers—Contractor, Central Construction Co.

Hills Grove Airport—Hills Grove, R. I.—1943—U. S. Engineers—Contractor, Louis A. Byrne.

Howard Aircraft Corp.—St. Charles, Ill.—1943—U. S. Navy—Contractor, Standard Paving Co.

Lambert Field—St. Louis, Mo.—1943—U. S. Engineers—Contractor, Israel Bros.

Rome Air Base—Rome, N. Y.—1941-43—U. S. Engineers—Contractors, Turner Construction Co., Louis Meyersohn, Peckham Road Corp., Clinton Asphalt Co.

Stewart Field—Newburgh, N. Y.—1942-44—U. S. Engineers—Contractors, D. & F. Construction Co., John Arborio, Inc., L. G. DeFelice & Son, Inc.

Stewart Field—Aux. #1—Montgomery, N. Y.—1943—U. S. Engineers—Contractor, John Arborio, Inc.

Stewart Field—Aux. #3—Hackensack, N. Y.—1943—U. S. Engineers—Contractor, L. G. DeFelice & Son, Inc.

Syracuse Air Base—Syracuse, N. Y.—1942—U. S. Engineers—Contractor, Elmhurst Contracting Corp.

STREETCAR AND RAILROAD TRACK PAVING

Ingram, Pa.—1943—Pittsburgh Rys. Co.—Own forces.

Johnstown, Pa.—1943—Johnstown Traction Co.—Own forces.

Minneapolis, Minn.—Riverside Ave.—1939 and '41—Twin City Rapid Transit Co.—Own forces.

Minneapolis, Minn.—Chicago Ave.—1942—Twin City Rapid Transit Co.—Own forces.

Pittsburgh, Pa.—Fleming Ave.—1943—Pittsburgh Rys. Co.—Own forces.

St. Paul, Minn.—Randolph St.—1942—Twin City Rapid Transit Co.—Own forces.

South Bend, Ind.—SS & SBRR—1941—SS & SBRR—Own forces.

MISCELLANEOUS

Parking area—Sears Roebuck & Co.—Chicago, Ill.—1943—Contractor, Allied Construction & Supply Co.

Parking area—Municipal Airport—Chicago, Ill.—1943—United Air Lines—Contractor, Ready Coal & Construction Co.

Riverbank paving—Johnstown, Pa.—Unit #6 Channel Improvement—1943—U. S. Engineers—Contractor, Wm. O'Neil Sons Co., Inc.

Drive and parking lot—Erie Coach Co.—Erie, Pa.—1943—Erie Coach Co.—Contractor, John Heubel, Sr.

Access roads—Goodyear Aircraft Corp.—Akron, Ohio—1943—Goodyear Aircraft Corp.—Contractor, Thorpe Construction Co.

Drives, streets and walks—Central Park Homes—Cleveland, Ohio—1943—U. S. War Housing Project—Contractor, Shaker Construction Co.

Curb, gutter and alley paving—Minneapolis, Minn.—1940-43—City of Minneapolis—City forces.

ENR-D-8

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The Week In Engineering and Construction

GINEERING NEWS-RECORD • SEPTEMBER 21, 1944 • VOLUME 133 • NUMBER 12

FWA survey shows lag in postwar public works plans

Less than 8 percent of 16 billion dollar local government program, including federal-aid work planned by state road departments, is completely planned.

Many members of the armed forces ecting to find immediate postwar em- yment on public works construction be greatly disappointed unless k action is taken to increase the vol- e of completed project plans. This he conclusion to be drawn from a deral Works Agency report released week on postwar planning progress state, county and municipal agencies. hough the study indicates a reservoir ixteen billion dollars of construction ll stages of planning by local gov- mental bodies, projects that are in completely designed stage total only 144,000,000, and funds are available carry out but one-fourth of the proj- in this status.

Few active localities

This total is more disappointing when reakdown of the completed plans is de. This analysis reveals that only 9,000,000 of state highway work is dy for contract, and that two-thirds he $924,905,000 total (excluding cost and) of all other types of work for ch plans are ready was reported by state and local governments of only states—New York, California, Illi- , Michigan and Ohio. Further analy- shows that two-fifths of all completed ns for other than highway work is centrated in the five cities of New k, Chicago, Philadelphia, Detroit Los Angeles. The vast majority of cities under 25,000 population have de little planning progress.

right side of the survey picture is large volume of construction in the al design" and "preliminary design" es. This total provides for over n billion dollars of work and in- des nearly two billion dollars of high- projects and some $5,044,000,000 other types of construction.

emainder of the sixteen billion dol- reservoir is in the "idea" stage. This class accounts for over eight billion dollars, including nearly two and one-half billion dollars of highway construction.

Report is conservative

In preparation of the report it was assumed that no plans had been completed nor were being prepared by those government units that failed to reply to the FWA questionnaire. As a result, in the totals of completed plans for other than state highway work no projects are included for four states, none for nine of the 92 cities of a population of 100,000 or more, and for only 252 of the 599 municipalities in the 10,000-25,000 bracket.

Neither do the totals include normal maintenance projects, work now underway or to be completed as part of the war program, public housing, and federally financed projects, such as river and harbor operations.

All projects being planned were listed as falling in one of nine classifications. The classifications were: (1) Highways, roads and streets; (2) bridges, viaducts and grade separations; (3) airports, terminals and landings; (4) sewer, water and sanitation facilities; (5) schools and other education facilities; (6) hospital and health facilities; (7) public buildings other than those in classes 5 and 6; (8) parks and other recreational facilities; and (9) miscellaneous public facilities.

On the basis of this classification the greatest volume of construction planned was in the "highways, roads and streets" category. This situation is explained by the fact that $50,000,000 of federal funds was made available to the states

(*Continued on page* 73)

N.Y. City ready to spend $400 million on 1945 construction if U.S. pays half

New York City is prepared to carry out a $400,000,000 construction program in 1945 if Congress acts at once to meet half the cost, Mayor F. H. LaGuardia declared last Sunday in his weekly radio broadcast. The mayor also disclosed that in his annual capital budget message to the City Planning Commission he had certified that the city might safely incur debt up to $300,000,000 for capital projects in 1945.

The mayor's $400,000,000 program is made up of $150,000,000 of new capital expenditures for work other than highways and housing, which he expects to be matched with federal funds in a like amount, $30,000,000 of federal and state aided highway work, $30,000,000 to $40,000,000 of low-cost housing, $20,000,000 of improvements covered by assessments, $15,000,000 of new work on the Brooklyn-Battery Tunnel, and $1,000,000 spent by the Triborough Bridge Authority.

Mayor LaGuardia stated that the city and the New York City Tunnel Authority were planning to apply to the War Production Board for priorities on about 700 tons of nuts and bolts needed before work can be resumed on the Brooklyn heading of the Brooklyn-Battery Tunnel, work on which was stopped early in th ewar. The Tunnel Authority has the castings for the lining but lacks the large forged bolts that must be on hand before soft ground tunneling from the Brooklyn end can get under way again. The New York heading is in rock, so it can start anytime.

In the interim since the work was shut down the Tunnel Authority, according to Ole Singstad, chief engineer, has completed all its contract drawings and so is in a position to put a large amount of work under contract at any time.

(*Continued on page* 72)

Acme Photo

Atlantic City bears the brunt of a tropical coastal storm

Worst damage from the tropical storm that lashed the eastern seaboard last week occurred to New Jersey beaches and beach structures. At Atlantic City miles of boardwalk were torn up and piers extensively damaged. Hotels and homes were flooded and power service disrupted. Pictured above is a section of the beachfront at the resort city.

There was considerable marine damage, especially to small boats, all along the eastern coast. Trees throughout the area were blown down, blocking highways and carrying electric and telephone lines with them. Fallen electric wires were said to be the cause of many of the more than forty deaths attributed to the storm. Adequate warning and early evacuation of beach areas kept down the death and property toll though the latter has been estimated by newspapers at as much as $50 million.

In contrast to the 1938 storm (ENR Sept. 29, p. 386 and Oct. 6, 1938, p. 425) there has been little damage to important structures. A temporary pipe scaffold (right) extending 85 ft. above the roof of a 60-story building in midtown New York City was twisted but survived the 85-100 mph. gusts of wind at the height of the storm. No bridges of noteworthy size were affected and there were no floods of more than local consequence, despite two days of rain preceding the tropical downpour of the storm.

Serious water problems forecast for Arizona

Indications that large sections of central and southern Arizona soon may be confronted with a serious water problem as a result of a shortage of precipitation, now in its second year, were contained in a U. S. geological report issued Sept. 9 in Tucson.

The report, which dealt with ground water conditions and pumpage, showed that in Pinal County, pumping from underground supplies has risen from 372,000-ac. ft. in 1940 to 515,000-ac. ft. in 1943. In other regions, pumpage has increased proportionately.

Heavy decreases in water tables were also recorded in several areas. The report showed that in the Elroy area the table has dropped 12 ft. in the last two years and in the Maircopa district the drop was 10 ft. The total drop in the Elroy area from 1940 to Decmber, 1943, was 18½ ft. The Queen Creek area dropped 2½ ft. in 1942 and 3 ft. in 1943.

Governor and cabinet discuss Pittsburgh roads

A 5-year, $75,000,000, state highway improvement plan for Pittsburgh and Allegheny County was discussed by Governor Edward Martin and his cabinet at a meeting Sept. 8 in Pittsburgh. The plan involves 107 miles of road, and is part of the state-wide program to cost $516,000,000.

Plans for one-third of Allegheny County projects will be blueprinted by November, John U. Shroyer, secretary of highways, revealed. Plans for the Penn-Lincoln Parkway will be completed in October.

State and city officials have agreed tentatively to classify the Ohio River Boulevard extension as No. 1 project for postwar improvement, Penn-Lincoln Parkway to rank second in importance.

Texas State Highway 183, a faster and shorter route to Fort Worth from North Dallas, is scheduled to be opened for traffic in October.

Illinois reports on postwar planning

Detailed plans and specifications have been completed or are in progress for $35,538,000 worth of postwar public works in Illinois, exclusive of the city of Chicago, according to a progress report dated Sept. 1, by the Illinois Postwar Planning Commission.

In addition to plans already completed, sketch plans for $54,396,000 worth of work have been completed or are now in progress; surveys have been completed or are in progress for $18,700,000 worth of construction; while preliminary estimates only have been prepared for $128,758,000 of postwar public works.

Improvements included in this proposed $237,392,000 program cover street improvement, sanitary and storm water sewers, sewage treatment and water supply, schools and other public buildings, bridges and grade separation structures, airports and parks, power generating plants and distribution.

Senate cuts postwar highway fund to $1,350,000,000 for three years

Authorized annual appropriation for each of three years following the war set at $450,000,000 to be matched by the states

The Senate on Sept. 15 passed the den postwar highway bill (S. 2105) greatly amended form from the nal bill. Principal changes were duction in the amount authorized to ppropriated annually in each of the e postwar years from $650,000,000 the original bill to $450,000,000 oration of the 50-50 matching pro- s of prewar years, and changes in method of apportionment. Elimi- d were all provisions for using fed- funds for the purchase of rights- ay. The bill now goes to the House, re the Robinson bill is pending.

ction on the Robinson bill in the se (H.R. 4915) is to be postponed il after election, according to Major- Leader McCormack.

Distribution of funds

The $450,000,000 annual appropria- authorized in the Hayden bill is ded as follows: $200,000,000 for jects on the federal-aid system; 5,000,000 for projects on principal ondary and feeder roads; and $125,- ,000 for projects on the federal-aid tem in urban areas, communities of r 5,000 population.

The $200,000,000 for the federal-aid tem is to be apportioned among the es by the old federal-aid formula, area, ⅓ population, and ⅓ post-road eage.

Funds for secondary roads are to be portioned on the basis of ⅓ area, ⅓ al population, and ⅓ rural-delivery ds and "star routes." A further vision makes it possible for states ing a population density of more n 200 per square mile to expend se funds without regard to municipal ndaries. This provision would be ap- cable in Massachusetts, Rhode Island, nnecticut, New York, and Pennsyl- ia.

In states where the state highway de- rtments have control over all public ds, the secondary road funds can be nt on the federal-aid system, if ap- ved by the U. S. Commissioner of blic Roads. States affected by this vision are Delaware, Virginia, West ginia and North Carolina.

Funds for work in rural areas are to apportioned among the states in the io that the population of cities of 00 or over bears to the total popula- n of all such cities in the country.

All references to using federal funds for the purchase of right-of-way that were included in the original bill were eliminated from the amended bill as passed.

Of the $450,000,000 to be appropriated for the first postwar fiscal year, the sum of $100,000,000 is to become immediately available to the states for making plans and surveys and for construction, but no other part of the funds can be used to pay the cost of contracts entered into before the beginning of the first postwar fiscal year.

Crossing eliminations

Not less than 10 percent of all three classes of funds must be used to eliminate highway-railway grade crossings. The construction costs of such projects, other than those paid by the railways concerned, may be paid out of federal funds without matching by state funds, provided the railways pay not less than 15 percent of the construction costs.

In states that find it impossible to match their full share of the federal fund, the Federal Works Administrator may waive the matching requirements provided: (1) That all special taxes on motor vehicle transportation are applied to highway purposes; (2) that least 90 percent go to operating, maintenance and administrative expenses and interest and amortization of highway bond; (3) that the rate of none of such taxes has been reduced since Sept. 1, 1944, and that the proportion of such funds that is available for construction, together with any other funds for highway purposes, will be inadequate to match the federal allocations.

Forest and park roads

The bill also carries $25,000,000 for each of the three postwar years for forest highways, $12,500,000 for forest roads and trails, $4,250,000 for construction and maintenance of roads in national parks, and $5,000,000 for parkways to give access to national parks or monuments.

Up to 1½ percent of the federal funds can be used for advance planning of future extensions of the federal-aid system and for secondary roads.

As the states will have to put up about $405,000,000 of matching funds, this represents a total federal-aid program of about $900,000,000 per year for three years following the war.

Bragdon made Engineers' Chief of Construction

Brig. Gen. John S. Bragdon has been made Chief of Construction in the Office of the Chief of Engineers in Washington. In this position he will have general charge of all military construction activity in continental U. S. He was transferred to the Chief's office from command of the South Atlantic Division at Atlanta. In that position, since 1941, he supervised one of the largest and most diversified of the war construction programs, for which he was awarded the distinguished service medal for "exceptionally meritorious service."

General Bragdon

General Bragdon is a West Pointer and has served all of his professional career in the army. He came out of World War I a Major in the Corps of Engineers. In 1929-31 he was on duty in the Philippines returning to serve in the Chief of Engineers Office. In 1937 he was made District Engineer at Providence, R. I., serving there until 1941.

Fowler to So. Atlantic Division

Brig. Gen. R. F. Fowler has been appointed division engineer of the South Atlantic Division of the Corps of Engineers with headquarters at Atlanta, Ga., succeeding Brig. Gen. John S. Bragdon. General Fowler was born in Alexander, Neb., on Oct. 14, 1884. He attended the University of Nebraska for two years before his appointment to West Point, from which he was graduated in 1910 and commissioned a second lieutenant in the Corps of Engineers.

General Fowler

General Fowler has led an active army life since his first tour of duty as assistant to the district engineer at Rock Island, Ill., in September, 1910, serving at many stations throughout the country and abroad. He was promoted to the grade of colonel Feb. 18, 1939, and on June 14, 1940, he became commanding officer of the 20th Engineer Regiment.

From July 1, 1941, until Jan. 5, 1942, he served as chief of the operations and training section in the Office of the Chief of Engineers. On Jan. 14, 1942, he was made chief of the supply division and on June 19, 1942, promoted to the temporary grade of brigadier general.

FROM AN EDITOR'S NOTEBOOK

A visit to the Tennessee Valley reveals that the effect of drought on power production, future TVA construction, disposal of surplus equipment and stream pollution are matters currently commanding attention.

Knoxville, Tenn—Most frequent subject of conversation in the upper Tennessee Valley is the drought that has continued over several months. However, despite the lowest natural streamflow in 40 years and the largest demand for power ever made in the area, the Tennessee Valley Authority has been able to supply all the electricity demanded of it. About 200,000 kw. of steam units are in constant operation now to conserve water against a possibility of prolonged low runoff in the late fall and some power is purchased from other utilities in the Southeast. Reservoirs are a little lower than a year ago, but water to produce 2.4 billion kwh. of electricity is in storage and there is no foreseeable danger of serious shortage.

Future TVA construction

The Tenessee Valley Authority has some definite plans for additional major construction but on a curtailed and much slower schedule than the rush to provide power for war necessary industry in the area.

The South Holston and Wautauga projects on the upper Holston watershed, on which $11 million was spent as emergency power projects before they were stopped by the War Production Board, are the best prospect for immediate work. When completed, the dams will give flood protection to Kingsport and Elizabethton and are planned to permit power installations. Resumption of construction is contingent upon availability of materials and manpower. A long construction period is contemplated.

The Fort Loudoun Dam extension, a project to take the water from the Little Tennessee River through Fort Loudoun Dam by construction of a dam and a canal, is now a future project planned for a time when power requirements overtake the present energy available in the Tennessee Valley. Added storage at Fontana, Douglas and other reservoirs on the headwater tributaries of the Tennessee has increased the dependable flow to a point where additional units are economical for many of the dams, but, once the war industries slacken, there may be excess power available from existing installations.

Foundation conditions at proposed sites for seven flood control dams on tributaries of the French Broad River above Asheville are being investigated preparatory to planning for possible postwar construction. Compared to other TVA structures, these will be rather modest, the seven dams being estimated to have a total cost, including reservoir rights, of $7 million. None of them will incorporate power facilities.

Fontana Dam

Construction at Fontana, N. C. on TVA's largest dam has progressed to the point where both of the hammerhead cranes used for construction have been dismantled and sent to storage. As of September 1, about 100,000 cu.yd. of concrete remained to be placed from a total of 2,800,000 cu.yd. Filling the reservoir is scheduled to start November first when flow in the Little Tennessee is expected to be sufficient to permit bypassing water to operate the Cheoah and Calderwood dams of the Aluminum Co., immediately downstream.

Considerable work remains to be done in the reservoir, including removal of 24 miles of railroad track, replaced by a 15.5 mile relocation of a branch line of the Southern R. R. above reservoir level. Part of the track is being left in place until the "last minute" to permit removal of construction equipment by rail. Highway hauling for heavy machines is precarious and expensive over the mountain roads.

Fontana construction forces have a war bond payroll deduction of 21.3 percent from 100 percent of the nearly 3,000 on the payroll. Purchases through the job accounting offices amount to 24 percent of the total payroll; were 20 percent after the fourth war loan and 15 percent after the third loan.

Something new has been added to construction at Fontana Dam. Project Manager F. C. Schlemmer has had a public address system installed on the project, not just in the mess hall and at the time-checking gate, as has frequently been done at shipyards, but with outlets all over the project so that workmen need not, in fact cannot, miss the broadcast. The address system is used to "sell" Americanism, bonds, safety and the importance of the construction job. Top members of the construction forces and visiting dignitaries make recordings that are put on the address system at various times to reach workmen on all shifts.

Kentucky Dam

Tva's greatest flood control dam, and second largest structure in concrete volume, has reached final closure and pool-raising stage. The 184 mile long reservoir, extending across most of Kentucky and Tennessee to Pickwick Dam, has a capacity of 4,100,00 ac. ft. of usable storage, said to be sufficient alone to reduce flood heights at Cairo, Ill., by 2 ft. Use of the full pool capacity must await completion of railroad relocation sometime next spring. (See *ENR* Aug. 31 1944, vol. p. 251).

Second-hand equipment

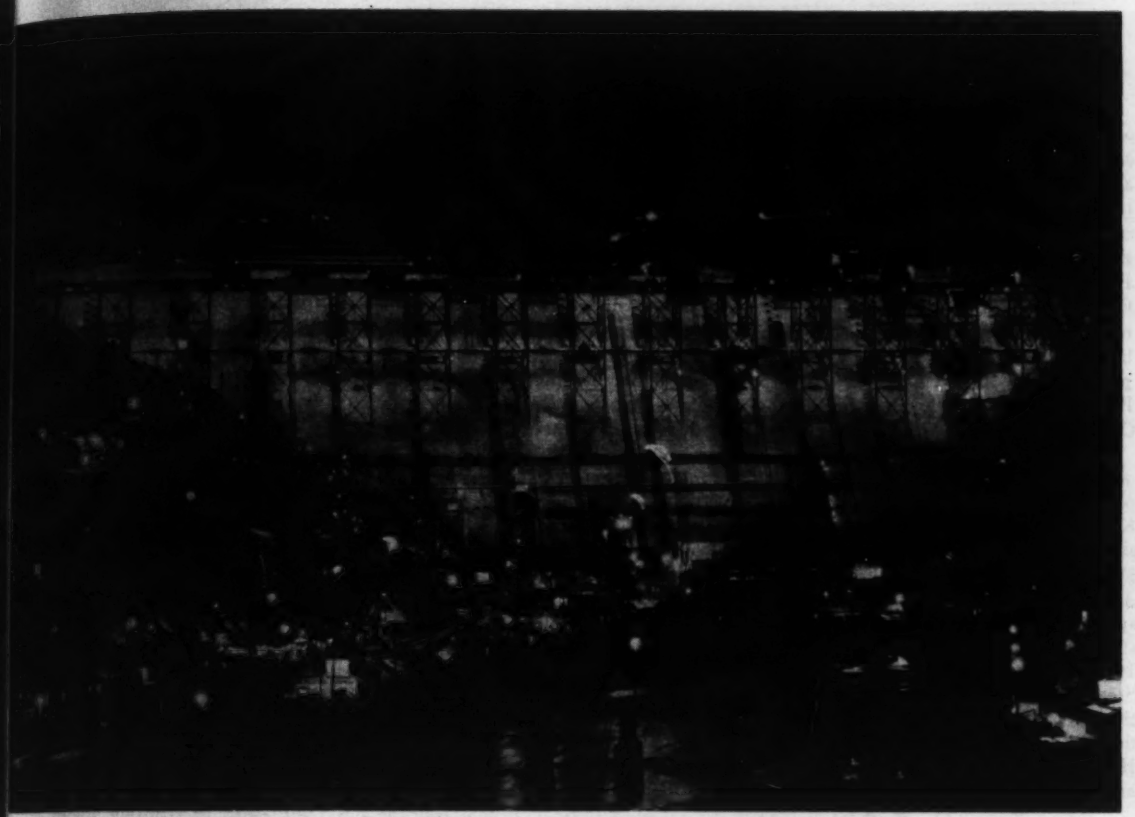
The Construction Plant Division of the Tennessee Valley Authority is in the second-hand equipment business. Under direction of R. T. Colburn it is disposing of $8 million worth of used construction equipment at a rate of $1 million a month. Some $4 million worth of equipment will be retained for possible future work. Prices are good, sales brisk.

In some cases ceiling prices, based on a percentage of cost new in 1942, are higher than cost of the equipment when it was purchased in the mid-thirties, so TVA is getting almost first cost for some long-lived, well-maintained machines. Small pieces are moving rapidly, some larger units are going into storage. Government and war contracts have preference; foreign countries are buying under approval of the War Production Board.

Incidentally, the Construction Plant Division of TVA, which has designed the plants for construction and supervised the purchase of all of the construction machines for the various dams, is getting a big hand for the work it has done. The scheme of doing the major construction plant planning for all TVA projects at a central point has worked out to the satisfaction of even those who were opposed to the idea when it was started in the early days of TVA. Capable designers, familiar with the equipment owned by the TVA, and just as familiar with the entire construction equipment market, were able to give the individual job the advantage of specialist help. Perhaps most important of all was the fact that the construction plant division was made up mostly of engineers, who had previously worked with contractors and understood the necessity for giving the "job" the kind of plant they wanted but with details worked out for most rapid operation.

Municipal affairs

A building code for the city of Knoxville, compiled by the Technical Society



Concrete placed only at night on TVA's Fontana Dam

Fontana Dam, built by the Tennessee Valley Authority in western North Carolina, approaches completion as mass concrete reaches roadway level in several blocks. This unusual sight view shows only one of the two hammerhead cranes used in the concrete placing operations. One had been dismantled before the picture was made, and the other has been taken down since, indicating the status of the project. Concrete is now being placed only on the night shifts to make the remaining cranes available for other work in daylight.

The dam, largest east of the Rockies and fourth highest in the world, will contain 2,800,000 cu. yd. of concrete and will be more than 470 ft. high above foundation rock. The hammerhead and whirley cranes are operating on what is known as the high-level trestle. The same trestle was used at midheight of the dam for the first stage.

Closure of the low-level outlets and start of filling of the reservoir is scheduled for Nov. 1. Two 91,500-hp., 75,000-kva. units are being installed initially with space provided for a third unit. Design and construction is being done by TVA's own forces. F. C. Schlemmer is project manager; Oren Reed, construction engineer and G. E. Murphey, construction superintendent.

of Knoxville and the local chapters of the American Institute of Architects and the Associated General Contractors of America, is now in the hands of the printer. The revised code provides for use of newly developed materials and incorporates a procedure by which materials may be submitted for approval and subsequent use as they become available in the postwar period.

Knoxville has plans for a new waterfront highway along the Tennessee River to be built possibly on a covered refuse fill. It is believed that the direct odor objection can be taken care of by immediate cover, but the possibility of river pollution from hydrogen sulphide, generated from surface water washing through the refuse, will require some study.

Pollution of the Tennessee River is a serious problem. About 600,000 people live along the Tennessee, but sewage treatment, of any sort, is provided for only 40,000. Industrial waste, with a population equivalent of 1,300,000 people, is dumped into the stream. Much of it is from pulp and rayon manufacture and is difficult and expensive to treat. TVA is cooperating with city and state health departments and with manufacturers to find ways and means of reducing pollution.

TVA on the march

Resale of electricity under TVA established rates has proved profitable to both the cooperatives and the municipalities that purchase TVA generated power. As postwar projects, several of the quasi-public organizations contemplate extensions of rural lines and construction of new buildings out of surplus. Some of the organizations that have been distributing TVA power the longest have reduced their residential electric rates to well below the TVA basic rate—100 kwh. at 2c, the next 250 kwh. 1c, and the next 700 at 0.4c. This makes the first 1,050 kwh. 0.73c and all in excess of this is 0.7c. per kw. Basic TVA rates start at 3c and reach a minimum of 0.75c per kwh.

Reflecting the interest of the world in the TVA experiment, negotiations are underway for translation of Chairman Lillienthal's book *Democracy on the March* into Italian, Portuguese, Hebrew and Chinese; a low cost edition is being printed in England, and orders for 1,000 copies at a time of the U. S. edition come from Australia. The Tennessee Valley Authority constantly is host to foreign engineers studying water utilization and regional development and a few engineers from China are spending several months in the Valley, studying all phases of the design and construction.—*H. W. H.*

News of the Engineering Schools

Frederic T. Mavis has been appointed professor and head of the department of civil engineering at Carnegie Institute of Technology, Pittsburgh, Pa., to succeed Prof. F. M. McCullough, who has retired. Mr. Mavis has held a similar position at the Pennsylvania State College since 1939.

His graduation from the University of Illinois in 1922 was followed by a period of professional practice with Kelker, DeLeuw and Co., consulting engineers in Chicago. Awarded the John R. Freeman traveling fellowship of the American Society of Civil Engineers, he spent the year 1927-1928 in Europe studying hydraulic engineering. From 1928 to 1939 he was on the staff of the State University of Iowa, serving some time as associate director in charge of the laboratory of the Iowa Institute of Hydraulic Research and as professor and head of the department of mechanics and hydraulics. Mr. Mavis has written and edited numerous papers and monographs in hydraulics, hydrology, and structural engineering.

An effort to formulate a description of the ideal engineering school graduate —as an engineer and as a citizen—for use as a basic guide in attacking the problems of postwar engineering education is being made at the Cooper Union School of Engineering, New York, it is announced by Dean George F. Bateman.

A faculty committee under the chairmanship of Louis M. Heil has been appointed to make a comprehensive study of the type of engineer the institution should endeavor to produce. This committee will consider not only the student's training in engineering, but also his ability to take his proper place after graduation as a valuable member of society.

The committee hopes, Dean Bateman said, to prepare a set of "specifications" which will describe the graduate in terms of all types of educational experience, rather than in academic requirements alone.

The project has been undertaken in the belief that too many specialized subjects have found their way into the conventional engineering school program, leaving too little room for necessary foundational subjects.

H. G. Baity is expected to arrive from Brazil this week to resume his duties as head of the sanitary engineering department of the Graduate School of Public Health, University of North Carolina. Dr. Baity has been on leave of absence from his post for almost two years, during which he has been serving as chief engineer and associate chief of party in Brazil for the health and sanitation division of the Office of the Coordinator of Inter-American Affairs.

In Brazil Dr. Baity has his headquarters in Rio de Janeiro, but he spent much of his time in the field directing the installation of sanitation facilities and construction of health centers in some remote parts of the country.

Restrictions relaxed on house remodeling

For the first time since the War Production Board clamped wartime restrictions on construction, that body will now permit one type of construction, in designated areas—which need not be war industry areas—without limit as to extent of work or dollar value. The new ruling covers remodeling and conversion of large apartment and dwellings to provide more small housing units in areas where the National Housing Agency finds an extreme housing shortage exists.

New York City is the first to be so designated, and it already has conversion applications on file with NHA. Despite that city's loss of wartime population, an acute shortage of middle-rent apartments is said to exist. This shortage could not be met under WPB restrictions, because the need was not for war workers.

Washington, D. C. is expected to be the second city to be named. NHA officials will make no estimate of how many areas will prove to be eligible for the unlimited conversion program, the number of buildings or units affected, nor the dollar value of the remodeling. They do say, however, that many thousands of new units may result.

Before an area can be designated as having an extreme housing shortage, it must be cleared with the Areas Production Urgency Committee of WPB. Thereafter, individual applications to remodel must be made on WPB Form 2896 and filed with the nearest FHA office. Approval of the application carries with it an AA3 priority rating, which WPB holds is in general sufficient for most materials required. Rents for the new units will have to be approved by the Office of Price Administration. The new program is designated H-3, under which housing heretofore has been permitted only to relieve individual cases of hardship.

Except in the areas approved by NHA, the provisions of WPB construction order L-41, limiting construction on a dwelling unit in any calendar year without WPB authorization to $200, and with a $1,000 limit for an apartment building to house six families, still apply.

Employment of ten additional engineers to assist in designing the water board's $20,000,000 postwar program was approved by the Detroit, Mich., city council, recently. The engineers are needed to expedite the planning now being done on parttime by most of the board's 53 regular engineers.

N. Y. City to spend $400 million in 1945

(Continued from page 67)

The last official barrier to wide-spread conversion of large New York apartments and old tenements into badly needed living quarters was removed this week when Charles S. Ascher, regional head of the National Housing Agency, designated the city as an area of "critical housing shortage."

Mr. Ascher's order embraced the five city boroughs and Nassau County. It followed by only a day the announcement of the War Production Board that it would authorize resumption of remodeling work by private owners, but only in communities where the NHA decreed there was a pressing need for additional housing (see report at left). This was believed to be the first area in the nation so designated.

On a twelve-acre site in Harlem overlooking the Harlem River, the Metropolitan Life Insurance Co. is planning to erect a modern residential community for 1,200 families. The new development is to be known as Riverton.

No estimate of the cost was available, but realty and building experts figured that the structural investment alone would amount to $5,000,000.

...WA survey shows lag in postwar works plans

(Continued from page 67)

...e preparation of highway plans on ...50 percent matching basis. State ...ments also indicated that much ...l and hospital construction is con...ated, while work being planned by ...metropolitan areas includes nu...s sewer, water and sanitation jobs. ...all areas, schools ranked high in ...ype of work which is now being ...mplated.

...a obtained as to available funds ...rry out the proposed projects re... that money is available or obtain... from local sources for one-fourth ...e projects for which plans are com...d. Replies indicated further that, ...early another quarter of the proj... the probable source of funds would ...axes, service charges and licenses. ...owing was anticipated in only a few ... Many reports indicated that the ...e of funds was unknown or that the ...cy was hopeful of federal aid.

Legislation and funds needed

...e failure of the cities of under 25,... population to complete plans was ...ained, in the majority of cases, by ...lack of either funds or legislative ...ority, or a combination of both. For ...ple, 27 state governments and 53 ...s of over 100,000 population are in ... predicament. In only four states, ...ely, New York, California, Michigan ... New Jersey, has legislation been ...ed to provide state funds to aid ...ty and municipal governments on ...ning, says the report.

...he Federal Works Agency, for which ... Gen. Philip B. Fleming is admin...tor, made the report for the special ...mittee on postwar planning of the ...se of Representatives. This com...tee, known as the Colmer committee, ...ested the survey to better evaluate ...eral Fleming's view that satisfactory ...ncing methods for postwar planning ...t be made available to many local ...rnmental bodies if they are to pre... plans.

...eneral Fleming recommended to the ...mittee a few months ago that a ...0,000,000 planning fund should be ...vided by Congress for this work, ...e of the money to be spent as grants ... 50-50 matching basis, but the major ...portion to be distributed as loans or ...ances, to be repaid when the work is ...structed. After making a study of ... findings of the survey completed last ...k, General Fleming still believes ...t a substantial federal fund is needed ...increase the tempo of postwar plan...g to the rate desired in order to get ... best results.

JOBS OF THE WEEK

RETAINING WALL, Michigan

Sunswick Corp., New York, N. Y., has been awarded a contract by U. S. Engineers, Detroit, Mich., for a retaining wall, at Sault Saint Marie lock at an estimated cost of $1,000,000.

BRIDGE, California

California State Division of Highways, Sacramento, Calif., received low bid of $727,858 for reconstructing a portion of existing bridge across the Sacramento River, at Rio Vista, from Lord & Bishop, and A. Teichert & Son., Inc., Sacramento, Calif.

RECYCLING PLANT, Katy, Tex.

Hudson Engineering Co., Houston, has been awarded a contract for the design and construction of a recycling plant addition for the Humble Oil & Refining Co., Houston, Tex. The estimated cost is $700,000.

STOREHOUSE, Williamsburg, Va.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for constructing storehouse, shed and storage building, at Naval Supply Depot, to Virginia Engineering Co., Inc., Newport News, Va., at $2,470,000.

BARRICADES, Merrimac, Wis.

Graham Paving & Construction Co., Chicago, Ill., was lowest bidder at $645,838 for barricade construction at Badger Ordance plant, for U. S. Engineers, Milwaukee. Mason & Hanger Co., New York, N. Y. is engineer and architect.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 181.

Low bids announced for Chicago filter plant

Low bids were received on Sept. 13 covering construction of the superstructures of the filtration and administration buildings at Chicago's South District filtration plant, according to W. W. DeBerard, city engineer. An attempt was made last July (*ENR*, July 20, vol. p. 62) to let a contract for this work, based on anticipated priorities of necessary materials, but no contract was awarded at that time due to the confusion among bids received covering the several alternate materials involved in the undertaking.

Priorities on all necessary materials now have been acquired and the work has been divided into four units to expedite the awarding of contracts. A total of 13 contractors, all from the Chicago area, submitted bids on the various divisions of the work, the largest of which includes reinforced concrete and masonry construction, ventilation, and electrical and architectural work. The three low bidders for this work are: S. N. Nielsen Co., $1,497,000; Gust A. Newberg Construction Co., $1,528,700 and W. E. O'Neil Construction Co., $1,534,590. Low bids of $82,120 were submitted by Robt. Gordon covering heating facilities and equipment, and $13,250 for piping. W. T. Mahoney & Sons' bid of $49,600 was low for the plumbing, sewers and drains.

Hays in Palestine on irrigation surveys

James B. Hays is now in Palestine in connection with proposed work on irrigation and flood control projects in that country. The work is under the direction of a privately-financed group known as the Commission on Palestine Surveys (*ENR* May 25, 1944, p. 772).

Some 900,000 ac. ft. of storage is proposed at three main dams with 450 miles of principal feeder canals. At present Palestine depends on dry farming. It is said that three times the present population of 1,500,000 can be supported in the country under the proposed irrigation plan.

Mr. Hays will investigate the proposed dam sites and make preliminary studies and plans in cooperation with engineers in Palestine. He has been with the Commission on Palestine Surveys for more than a year, working in this country on advance planning. Hays formerly was construction engineer for the Tennessee Valley Authority at Chickamauga and Kentucky dams and before that was with the Bureau of Reclamation on irrigation work.

OBITUARY

Edward H. Heinneman, assistant to the regional director for the Bureau of Reclamation at Amarillo, Texas, died Sept. 10. Mr. Heinneman, a graduate of the University of Denver, had worked on the Boulder Dam, on the Central Valley project, and in Washington, D. C.

Mark L. Reed, Jr., 40, Asheville, N. C., contractor, died Sept. 6. President and treasurer of Reed and Abee, Inc., contractors, Reed was widely known for office buildings he had constructed throughout North Carolina.

John P. Cullen, 77, a leading general contractor in Wisconsin died Sept. 4 at Janesville. He had many large contracts in Wisconsin, Indiana, Iowa, North and South Dakota, Nebraska, Illinois, and Florida. He served two years as president of the Wisconsin Constructors, Inc., and two terms as president and later director of the Wisconsin chapter of the Associated General Contractors of America.

James Page, 79, a retired consulting engineer at one time connected with the Port of New York Authority, died in Baltimore, Md., Sept. 11. After his graduation from Johns Hopkins in 1882 Mr. Page took special courses at Massachusetts Institute of Technology. He prepared publications for the United States Hydrographic Office, 1893-1905; was chief of the division of ocean meteorology of the United States Weather Bureau, 1907-08; and chief engineer of the water supply and sewer system of Cienfuegos, Cuba, 1908-12.

Payton M. Marshall, 55, Houston, Tex., contractor since 1905, died at Houston, August 31. He built and remodeled many Houston buildings.

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Big new naval hospital for San Francisco area

Plans for the early postwar construction of a $6,500,000 permanent hospital in the San Francisco Bay area were announced recently by Twelfth Naval District headquarters in San Francisco.

The hospital will be a 1,000-bed, fireproof concrete or brick structure comprising 12 main buildings and six subsidiary buildings, and will require a 100-acre site. Naval authorities said the hospital probably will be located on the west side of the bay in proximity to the U. S. Naval drydocks at Hunter's Point.

A.S.C.E. field secretary named on Pacific coast

H. L. Thackwell of Pasadena, Calif., has been named field secretary for the American Society of Civil Engineers to serve the eleven Western states and Texas. For the present Mr. Thackwell will make his headquarters in Pasadena.

Appointment of a field secretary who would be resident on the Pacific Coast was authorized by the Board of Direction of the society some months ago in order to give the members in that region closer contact with the secretarial staff, and to make available to the local sections and student chapters the services of a member of the staff on questions arising in connection with matters in which the society is currently interested, such as collective bargaining.

Mr. Thackwell has been in engineering work in the Southwest and Latin America for the past 30 years, specializing largely in sanitary engineering.

MEETINGS

National

AMERICAN PUBLIC WORKS ASSOCIATION, annual congress, Hotel St. Paul, St. Paul, Minn., Sept. 24-27.

INSTITUTE OF TRAFFIC ENGINEERS, 15th annual meeting, Sherman Hotel, Chicago, Ill., Oct. 1-4.

AMERICAN PUBLIC HEALTH ASSOCIATION, second wartime public health conference and 73rd annual business meeting, Hotel Pennsylvania, New York, N. Y., Oct. 3-5.

FEDERATION OF SEWAGE WORKS ASSOCIATION, annual meeting, William Penn Hotel, Pittsburgh, Pa., in conjunction with 17th annual conference of the PENNSYLVANIA SEWAGE WORKS ASSOCIATION, Oct. 12-14.

INTERNATIONAL CITY MANAGERS' ASSOCIATION, annual conference, Medinah Club, Chicago, Ill., Oct. 12-17.

AMERICAN WELDING SOCIETY, 25th annual meeting, Hotel Cleveland, Cleveland, Ohio, Oct. 16-19.

SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS, fall meeting, Carter Hotel, Cleveland, Ohio, Oct. 17-20.

ENGINEERS' COUNCIL FOR PROFESSIONAL DEVELOPMENT, 12th annual meeting, 29 West 39th St., New York, N. Y., Oct. 20-21.

AMERICAN MUNICIPAL ASSOCIATION, annual conference, Hotel Blackstone, Chicago, Ill., Oct. 25-27.

NATIONAL COUNCIL OF STATE BOARDS OF ENGINEERING EXAMINERS, annual meeting, Hotel Lafayette, Lexington, Ky., Oct. 30-31.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, annual meeting, Atlantic City, N. J., Oct. 31-Nov. 2.

HIGHWAY RESEARCH BOARD, annual meeting, Netherlands Plaza Hotel, Cincinnati, Ohio, Nov. 22-25.

Regional and Local

NORTH CAROLINA LEAGUE OF MUNICIPALITIES, 36th annual conference, Winston-Salem, N. C., Oct. 4-6.

GEORGIA WATER AND SEWAGE ASSOCIATION, 13th annual meeting, Georgia Institute of Technology, Atlanta, Ga., Oct. 5-7.

SOUTHWEST SECTION, AMERICAN WATER WORKS ASSOCIATION, Stephen F. Austin and Driskill Hotels, Austin, Texas, Oct. 17-19.

MISSOURI VALLEY SECTION, AMERICAN WATER WORKS ASSOCIATION, Hotel President, Kansas City, Mo., Oct. 23-24.

CALIFORNIA SECTION, AMERICAN WATER WORKS ASSOCIATION, annual meeting, Hotel Biltmore, Los Angeles, Calif., Oct. 24-26.

WEST VIRGINIA SECTION, AMERICAN WATER WORKS ASSOCIATION, annual meeting, Hotel Chancellor, Parkersburg, W. Va., Oct. 26-27.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA, 5th annual water conference, William Penn Hotel, Pittsburgh, Pa., Oct. 30-31.

CAROLINA BRANCH, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, 24th annual meeting, Carolina Hotel, Southern Pines, N. C., Oct. 30-31.

WEEKLY CONSTRUCTION SUMMARY

CONTRACTS

Continental U. S. Only
(Thousands of Dollars)

	Week Ending Sept. 28 1943	Sept. 14 1944	Sept. 2 1944
Federal	$54,094	$27,436	$9,88
State & Municipal	8,366	8,041	4,95
Total public	$62,460	$35,477	$14,83
Total private	9,491	6,993	4,39
TOTAL	$71,951	$42,470	$19,22
Cumulative 1944 (38 weeks)			$1,848,71
1943 (38 weeks)			$2,437,65

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	1943 38 Weeks	Cumulative 1944 38 Weeks
NON-FEDERAL	$276,461	$346,53
Corp. Securities	17,408	96,04
State & Mun.	98,920	109,72
RFC Loans	9,000	57,79
FPHA Loans	3,133	20,06
REA Loans	20,000	63,09
Fed.-Aid Hwy.	128,000	
FEDERAL	$2,753,838	$1,263,89
TOTAL CAPITAL	$3,030,299	$1,610,35

ENR INDEX NUMBERS

		1913	1926
Index base—100			
Construction Cost	Sept. '44	300.46	144.4
Building Cost	Sept. '44	236.00	127.8
Volume	Aug. '44	121.	53.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Moment Balancing

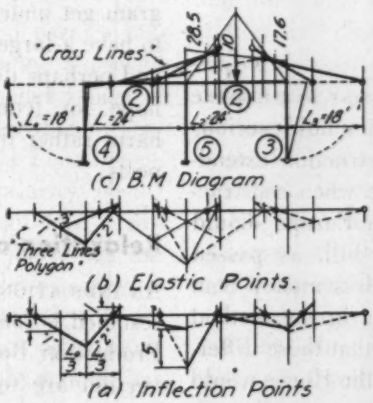
Sir: In the paper "Moment Distribution by Linked Rigidities", (*ENR* June 1, 1944, vol. p. 802), D. B. Steinman has shown a most interesting graphical method for moment distribution. However, a greater speed in distribution of moments may be obtained with the graphics termed "three line polygons" and "cross lines", as illustrated in the accompanying sketch.

The inflection points on the member axis are determined with line 2 drawn through the stiffness ordinate at the support and one-half basic stiffness at the third point of span, sketch (a). The stiffness ordinate at the support represents the stiffness of support as determined with line 1 drawn through the inflection point at the far end and one-half basic stiffness at the third point of the span. The basic stiffness is the ratio of the moment of inertia to the span length, I/L. The basic stiffnesses are shown in the circles sketch (c).

The elastic points on the member axis are determined with "three-line polygons", sketch (b). Line 2 in sketch (b) is the same as that shown in sketch (a). Line 1 is drawn through the inflection point at the far end and the stiffness ordinate at the support. Line 3 is drawn through the intersection point of line 1 with the vertical at the third point of the span and one-half basic stiffness at the third point in the following span. The intersection point of line 3 with the member axis is the elastic point.

The closing line in the moment diagram in sketch (c) is drawn through the closing points on the inflection point verticals determined with the "cross lines". The cross lines are constructed on the central moment ordinates. The inflection points and the central moments in the haunched beams are determined with constants given in the booklet entitled, "Analysis of Continuous Frames by Graphical Distribution of Moments", published by the writer.

Distribution of moments in the accompanying sketch is entirely graphical, and the procedures are not increased in geometric proportion to the number of spans.



A. A. EREMIN,
Associate Bridge Engineer,
California State Highways,
Sacramento, California

Air in Concrete

Sir: The editorial "Toward More Durable Concrete" (*ENR.* Aug. 24, 1944 vol. p. 213) contains the statements quoted below which appear to the writer to be an example of the confused comprehension of air-entrainment in concrete:

"If strength is not to be seriously affected air should not greatly exceed 3 percent; in other words unit weights should not be reduced more than from 148 to about 143 lb. per cu. ft. And where it is important to avoid loss of strength the mix should be redesigned by reducing both sand and water content by about the volume of the added air, thus in effect reducing the water-cement ratio."

It is important in discussions of the air content of concrete to distinguish clearly between air-content, per se, and what is referred to as "added air" in the editorial. Concrete made with plain cement may contain air in amounts varying from slightly less than 1 percent to as much as 3 percent. Generally, the air content of concrete, having a normal cement content, is between 1.5 and 2 per cent. Therefore, it would be an inadequate use of the potentialities of air-entraining cement to require that "air should not greatly exceed 3 per cent". Actually, it has been concluded by most investigators that the *added* air need not greatly exceed 3 per cent to realize the potential advantages of this type of cement. This would bring the total air content close to 5 per cent.

In this connection, attention is invited to the statement in Appendix 1 to the Annual Report of A.S.T.M. Committee C-1 on Cement for 1944 (preprint No. 41, p. 70) that "extensive field experience and laboratory tests have shown that an air content in concrete of 5 to 6 per cent is the optimum for obtaining maximum workability, bleeding reduction, and durability with a minimum of strength reduction". That statement was written by this writer with the firm belief in the old axiom that one cannot have his cake and eat it, too. Strength need not be sacrificed greatly, if at all, but the object in using air-entraining cement is to obtain the properties peculiar to its use. If strength of test specimens is of greater importance, plain cement should be used.

Issue is taken, too, with the use of the word "re-design" with regard to mixtures containing air-entraining cement. All concrete mixtures should be *designed* with the materials to be used on the project, including the particular brand and type of cement whether or not "loss of strength" is to be avoided. It is true and important that air-entraining cement mixtures will possess appreciably lower sand and water contents if properly designed in optimum proportions than would mixtures of similar workabliity containing a similar amount of plain cement, but this is not accomplished by "re-design".

Your very truly,

CHARLES E. WUERPEL,
Engineer-in-Charge U. S.
Central Concrete Laboratory,
Corps of Engineers,
Mt. Vernon, N. Y.

EDITOR'S NOTE—The air referred to in the editorial was "added air" as the reference to reduction of unit weight shows. It would have been better to have said so more definitely. "Re-design" is probably what everyone will do the first time he uses the new cements, but Mr. Wuerpel is right in insisting on explicit terminology.

EDITORIALS

VOLUME 133 NUMBER 12

September 21, 1944

Compromise Needed

THE CONTINUED FAILURE of Congress to complete action on postwar highway legislation holds serious threat of set-back to highway construction extending many months beyond the time when construction can be resumed if the war in Europe should end soon. The amended Senate bill, as passed last week, now carries somewhat less money than the House bill, and the two differ in the method of apportionment. It would seem that these differences could be adjusted quickly if the House would act on its bill, but that body has put all such things aside until after election. If Congress, when it reconvenes, is preoccuped with war legislation or reconversion, there may be further weeks of delay, thus leaving the states in uncertainty at the time their own highway legislation should be in preparation. Responsibility for this condition is not entirely the fault of Congress. A considerable part rests with the state highway authorities for their failure to agree on what they would ask from Congress in the way of postwar highway legislation. All of which means state highway officials can help speed action by Congress by not being too insistent in demanding that their particular ideas be written into the final law.

Subsidies for Local Work

NEW YORK CITY, according to Mayor LaGuardia, has $400,000,000 of postwar work ready to put under contract in 1945 should the war end—provided the federal government will put up half the cost. From what has been said recently in Congress with respect to curtailment of non-war expenditures the prospect for federal aid, other than for highways and perhaps for low cost housing, appears remote indeed. More basically, however, local postwar construction, to be effective in quick relief of possible unemployment, should be independent of federal aid. Hence it seems unfortunate that New York, which has set such a splendid example in getting plans in shape for an early start, should take the lead in asking Congress for large grants, thus in effect passing control over its program to the federal government. Obviously, any community that asks for and accepts a large federal grant must also accept a large measure of federal control. That means another big PWA organization and all the delays inherent in remote control from Washington. New York has $150,000,000 of work, which can be put under way without a subsidy. Better to have this really substantial program get under way without strings attached than to have a large program dominated by Washington and perhaps delayed by it. New York's expressed hope for federal aid, if pushed too hard, can harm rather than help postwar construction prospects.

Relaxation of Restrictions

AN INDICATION of how normal construction may be resumed is found in the announcement of the War Production Board that restrictions on house conversion are to be lifted in areas where there is a critical shortage of housing to permit the conversion of large houses and apartments into smaller units. A considerable amount of construction composed of many relatively small operations can be put under way in this manner, thus giving WPB a measure of the effect of such relaxation on war activities. Indeed it could go farther and permit other types of small jobs—culverts, water and sewer line extensions, street paving and the like—to go ahead. They require a minimum of transportation service and special material, and, moreover, can give employment quickly in a large number of widely-scattered communities. If no effect detrimental to the war effort develops, then further relaxation should be possible. The immediate result of such minor relaxation of restrictions on construction may not be apparent, but it will have the cumulative effect of getting more and more contractors back into action, thus facilitating a more rapid expansion of the larger jobs when the time comes to lift restrictions completely.

Transportation Trends

CONSTRUCTION OF A UNION TERMINAL for over-the-road freight trucks in New York City after the war, as proposed by the Port of New York Authority, is indicative of a trend in freight handling that should result in much more construction of a like nature in the postwar period. The Port Authority's new truck terminal is designed to save a large amount of cross hauling by trucking companies just as its big offrail freight terminal built several years ago was designed to reduce the unnecessary hauling of part loads from Man-

ttan to rail terminals in New Jersey. The Port uthority plans similiar union truck terminals in w York City and in adjacent New Jersey based studies now being made. Like union truck facili-s could be used to advantage in other cities.

rthquake Lessons Repeated

HE PICTURE OF ROOF PARAPET and cornice ma-nry piled across the entrance to the Cornwall nt., school, published last week in our report of e Sept. 5 earthquake, has a startling resem-lance to those published following the Long Beach, alif., quake of 1933. Such similarity is—or ould be—disconcerting, and it can also prove rtuitous. That schools and other buildings are ill being topped-out with unstable masonry is use for anxiety, as is the realization that an rthquake sufficiently strong to throw down para-ets, cornices and plaster in wholesale manner has ccurred in the Northeastern United States and djacent parts of Canada. The fortuitous element f the similarity to damage in the Long Beach uake (and to that incurred in 1925 at Santa arbara, too, for that matter) is that an awakening especting earthquake-proof design may ensue, sim-lar to that which took place in California.

If design changes to make structures reasonably esistant to earthquakes were either extensive or xpensive there would be more excuse for the exist-ng situation. They are neither, however, and to nchor parapets and cornices sufficiently to resist he horizontal forces of the great majority of earth-uakes involves not much more than should be one to take care of a reasonable wind load.

It is to be hoped that the extensive damage at Cornwall may cause Easterners to look with a ittle less complacency and self satisfaction on heir "safer" location as compared to the West Coast, even though the record so far may favor hat belief. Earthquakes "can happen here", and re happening every year. Someday one will oc-ur when school is in session, and children will be rushed by falling masonry. Engineers and archi-ects should not wait for such a tragedy to cast loubts upon their abilities.

Anchor parapets, or don't use them. Provide easonable resistance to horizontal forces in foun-lations, frames, floors and walls. These are the essons that all earthquakes have emphasized, and his latest one merely repeats them.

A Two-Fold Objective

PARTICIPATION of the United States government in the development of industrial and other resources of South America has given rise to frequent expressions of concern in this country. Principal cause of alarm is the belief that our financial loans and other aids directed toward foreign industrialization will destroy markets for many goods that are now exported from the United States. Quite conceivably, such ideas may be generated by a reading of the article on Peru's industrialization of the Chimbote Bay region (page 96). Further reflection, however, will reveal that the United States stands to gain by extending a helping hand to countries like Peru, where strenuous efforts are now being made to improve economic conditions.

For example, when Peru has completed its iron and steel plant it will be in a position to produce rails, reinforcing bars and cast iron pipe, which are now imported at high prices because of shipping charges. The dollar exchange thus freed should then be available for the purchase of more expensive steels and finished products whose dollar value is high in comparison to weight. Furthermore, production of heavy-tonnage iron products in Latin-American countries can hardly be considered a threat to our export business because in the past much of this was supplied by Europe anyway. Likewise, in connection with the development of hydroelectric power facilities, any aid that we contribute should result in almost immediate benefits to exporters of electrical equipment and certain types of consumer products.

Another, less tangible, benefit from promoting higher standards of living in South America, is the contribution that this will make in the establishment of more stable governments and future world peace. It is axiomatic that when the living standards of a people are being improved, the likelihood of dissatisfaction with the government that provides such benefits is largely eliminated. A final argument that favors our support of industrial developments in the countries south of the border may be drawn from our past experiences in foreign trade, viz., that our best customers are also our biggest competitors.

In many respects, the engineering and financial aid we may give to Peru might well be considered a selfish strengthening of our foreign markets as well as a contribution to hemispheric solidarity.

NGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor* Copyright, 1944, by McGraw-Hill Publishing Company, Inc.
DWARD J. CLEARY, *Managing Editor. New York:* V. T. BOUGHTON, A. N. CARTER, H. W. HUNT, E. R. DENMARK. *Chicago:* H. W. RICHARDSON, . R. CARR. *Washington:* PAUL WOOTON, CHARLOTTE DuBOIS, *San Francisco:* N. A. BOWERS. *Consulting Editors:* F. E. SCHMITT, W. W. DeBERARD
DITORIAL OFFICES: 330 WEST FORTY-SECOND STREET, NEW YORK, N. Y.

ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Steel-Paved Steps to Tokyo

H. W. Richardson
Western Editor, Engineering News-Record

***Contents in Brief**—The northern road to Tokyo follows the 2,000-mile sweeping curve of the Alaska Peninsula and the Aleutian Islands. Along this road the armed forces have built a series of airports on the barren Arctic tundra that form aerial stepping stones to the Nip homeland—steel-paved steps that are surfaced with steel plank mat. This steel paving has made fast construction of the airfields possible. As the task forces moved westward, island by island, each conquest brought new problems in runway construction. At Adak the field was built in a tidal swamp closed off from the sea by a sand dike; at Amchitka the strip was built under enemy bombing.*

FROM THE MAINLAND OF ALASKA, down the narrow curving length of the Alaska Peninsula and on out to the far end of the chain of bleak Aleutian Islands the armed forces are building a series of airports—a 2,000-mile military lifeline. The landing strips are hard surfaced as far westward as the middle of the peninsula. But from there on they are mostly steel mats—one of the war's miracle products—for they are being built in a hurry far from sources of materials and equipment.

These fields are an extension of the airport network in the interior of Alaska and the southeastern panhandle. They were started for the defense of the mainland, carried ahead for clearing the Japs out of the Aleutians, and now stand as steel-paved steps to Tokyo. Already the north end of the Nipponese empire at Paramushiro has been bombed from Aleutian bases.

Army, Navy and civilian job

Contractors, Navy Construction Battalions and Army Engineer troops have all participated in building the Alaska-Aleutian airport network. In the interior of Alaska and along the seacoast fringe of the mainland several fields were contractor-built for the Civil Aeronautics Authority as a peace-time operation. When Alaska became a vital defense zone the army engineers took over many of the CAA projects, improving some by contract, others by engineer troops. Then the army went ahead with other airports, again letting some by contract and building others with troops.

In August, 1940, with the start of defense construction in this country, the army engineers moved into Annette Island, near Ketchikan, Alaska, to build the first big air base for the protection of the Alaskan coastline. When this was completed, they moved further up the coast to Yakutat, on a similar project. Mud, deep, sticky, endless mud, soaked by the Alaskan coastal rains that total 180 in. per year, and churned up by scrapers and other dirt-moving equipment, proved to be the biggest difficulty in building these two bases. Eventually they were completed, with concrete-paved strips, and the engineers moved on westward.

Meanwhile, the Navy was at work on its three principal Alaskan bases—Sitka, Kodiak and Dutch Harbor. At first all the navy work in this territory was done by contract, but in the summer of 1942 the contracts were terminated and the work was taken over by the Seabees. Each naval base includes landing strips for both land-based and amphibious planes. In addition to the airports at the bases, the army built substantial supporting airfields nearby.

The supporting field for Dutch Harbor played an important part in thwarting the Jap attack on that base in June, 1942. Because of the ruggedness of Unalaska Island, upon which Dutch Harbor is located, the next island westward, Umnak, was selected as the site for the auxiliary army base.

Surprise for the Japs

Construction work at Umnak was kept secret, and at the time of the Jap attack on Dutch Harbor had been completed far enough to accommodate a fighter squadron. When the Jap struck with a superior force, land-based planes from Umnak came to the rescue. The Nips were so surprised to see planes attacking them from the west that, after getting in a few damaging blows, their fleet turned tail and ran westward, finally landing forces at the unoccupied island of Kiska, Aggatu and Attu at the far end of the Aleutions. It took us 15 months to clear the enemy off these last islands.

As part of the air route from the mainland to the islands the army built three substantial fields at Naknek, Port Heiden and Cold Bay along the north side of the long Alaska peninsula. Some of the engineer troops that slashed the pioneer road of the Alaska Highway through the wilderness participated in the construction of these facilities.

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Our successful invasion of Attu
May 11, 1943 (*ENR* Dec. 30,
vol. p. 492). The taking of Attu
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e too hot for the Japs on Kiska,
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prior to our invasion on Aug.
943, bringing to a close the
to clear the enemy from the
ians. So much for a brief resume
tactical operations.

Pierced plank paving

Seabees helped build the Um-
irport, and are working with the
on a landing field at Attu, to be
jointly by the army and navy.
here in the western Aleutians
irports are being built by army
eer troops.
e material alone made possible
st construction of these outpost

The north road to Tokyo follows the Alaska Peninsula and the curving chain of the Aleutian Islands. The Jap base at Paramushiro has been bombed.

airports—steel mat surfacing. Several types of steel mat have been developed but that known as pierced plank has been found most suitable for Aleutian conditions. This type consists of steel sheets about ¼ in. thick, 16 in. wide and 10 ft. long, pierced by three rows of cupped holes 3 in. in diameter, stiffened with two longitudinal ribs pressed into the plate, and fringed with a series of slots and bayonet hooks, the latter bent downward at a 45-deg. angle. These hooks engage the slots of adjacent sheets when over lapped about 1 in., forming a tight, smooth interlocked steel mat that is substantial and durable, well liked by the pilots because of its smoothness and because they can make belly landings on the mat in emergencies with a good chance of walking away from the disabled ship.

The sheets weigh 65 lb. apiece, (easily handled by two men) or 5.2 lb. per sq. ft. in place on the field. Usually the mat is laid on a sand base, for on most of the islands is found a fringe of dunes of volcanic sand which supply this needed material. In general, the sheets are laid transverse to the long axis of the runway with joints staggered. Staggering the joints leaves alternate rows of sheets either 5 ft. too long or two short. Usually each shipment includes a number of half-length sheets to fill

Steel plank runway surfacing is laid in fast time by experienced engineer troops using only simple tools.

Timber tide gate keeps out the sea at high tide, drains off the dike-enclosed field at low tide for an unusual airport on Adak.

Water within the dike-enclosed field is kept under control by three pumps like this one, powered by diesel engines.

in at the ends to make a straight line edge on both sides, but sometimes the short sheets are not available. The ragged edges invite wind erosion of the sand when the base material is unusually fine, so in some cases end filler sheets are made by cutting standard lengths in half with arc welders.

The sheets are overlapped in two different ways. One, known as the Venetian blind system, is to lay one edge on top of one adjoining sheet and under the sheet on the other side. The second method, called "over-and-under" is to lay alternating rows on top of both adjoining rows. Experience proved the best method is to lay the ends of the runways, where planes land and take off, and traffic is predominantly in one direction, by the Venetian blind system with the high side toward midfield, and to lay the center section over-and-under for two way traffic. After the bayonet hooks are inserted into the slots of the adjacent sheets the newly-laid steel plank is shoved endwise to fully engage the hooks. Two spring clips are then pounded into two slots in each sheet to keep the hooks from backing out.

At one runway the Air Corps requested the sheets be laid longitudinally with the idea that perhaps the surfacing would be smoother for small planes. However, the big bombers caused the sheets laid in this manner to warp and buckle, so it was necessary to tear up the runway and relay the plank transversely, after which further trouble was experienced.

The sand base, built with scrapers and bulldozers, is leveled off by dragging with scrapers when the material is dry, by road graders when wet, followed in each case by dragging with timbers pulled by tractors. Final finishing, just ahead of laying the steel sheets, is by hand shovels and rakes. After laying, the holes in the steel plank are filled in by spreading sand over the mat with hand shovels. Excess sand on the surface soon works down through the steel to fill up local low spots or blows away. A transverse crown of 1½ per cent is carried from the edges toward the center of the strip. Experience has shown that the sand subgrade when graded on straight slopes to an apex at center of runway settles into a desired curved crown within a few days under traffic.

Umnak alone proved the worth of steel mat surfacing even if another field had never been built in the Aleutians. When the Japs were threatening to invade Alaska and the islands in 1942 the engineers were working fast to get the airfield at this site completed for the protection of Dutch Harbor. Time was short, so instead of grading up the usual sand base the engineers laid the pierced plank mat directly on the tundra, that grass-covered swampy ground that covers much of the Aleutians. Their judgment and speed paid off in big dividends, for within a few days after enough mat had been laid to form a suitable landing strip for a fighter squadron the Japs attacked Dutch Harbor. One Umnak-based squadron took off from the steel-paved swamp and went to work on the invading fleet. Taking advantage, as always, of local materials whenever possible, the Army Engineers used a mountain of volcanic cinders at Umnak for surfacing the permanent airport on that island.

Airport built in tidal swamp

At Adak, about two-thirds of the way out in the Aleutian chain, one of the islands, one of the most amazing airports in the world was built with remarkable speed. Our troops made an amphibious landing on Adak at Sweeper Cove at the south end of Kulak Bay on Aug. 31, 1942. As in

ays the case in the Aleutians, the step after landing was to build ight strip. There was no time for leisurely reconnaissance of the nd, no time for instrument sur-s, and after a 90 minute consulta- the engineers decided to place the landing strip in a tidal swamp.

The site selected was Sweeper Val- about 4 miles long lying parallel the west shore of the bay, sepa- ed from the sea by a low ridge of d hills. Bounding the valley to the t is a range of foothills that break k into high mountains. Sweeper ek, draining these mountains, en- the valley from the west about dpoint and meanders south to the through a tidal swamp that was oded 5 ft. deep at every high tide. While Sweeper Valley was open to sea at both ends, drainage in gen- l was toward the south end, and south part of the valley was ected as the site for the first emer- ncy runway. The swampy valley or lay between El. —1.5 at the ore line to El. 3.5 at midpoint.

Airport in four days

The engineers first threw up a mporary dike with bulldozers along e west, south and north boundaries the site, shoving the creek to the st, outside of the dikes. A ditch was t, with a road grader, along the nd hills to the east to drain the area thin the dikes. During high tides, hich reached El. 5, the area was rrounded by water on three sides; at low tide the south dike was breached with a bulldozer, permitting water which had filtered in at high tide to run off through the east ditch.

Armed with bulldozers and tractor-hauled scrapers, the engineers moved some of the sand dunes into the swampy areas of the proposed field and filled in the original creek bed. When drained of its water cover, the northern part of the area was found to consist of hard-packed sand that proved an excellent temporary runway when simply dragged and leveled off. Steel plank was hurriedly laid on the fresh sand fill section, and in four days after the original landing was made in assault boats the engineers had completed a strip long enough for a bomber to land.

After the first rush was over, a more substantial landing strip was built parallel to and west of the original strip. Here, also, the south end of the runway was sand fill, surfaced with steel plank, while the north end was merely the original sand bottom of the valley leveled off with timber drags. Another inside drainage ditch was dug between the new strip and the west dike. A new and higher sand dike was placed across the south end of the area. Included with construction of the second runway were taxiways and hardstandings (paved areas for parking planes) to form a complete airport.

To eliminate the necessity of breaching the south dike at every low tide to drain the enclosed area, the engineers built a tide gate consisting of several box culverts fitted with sliding gates. These washed out, however, so new tide gates were installed by driving a substantial pile trestle the length of the desired opening, then placing vertical sliding gates on both sides, operated by hand chain hoists, in guides fastened to the piling. These gates seat in a solid timber wall and have proved very satisfactory.

The two inside drainage ditches were connected at the south end, near the tide gates. To keep the water within the enclosed area under control at all times, three pumps with a combined capacity of 10,000 g.p.m. were installed to lift the accumulated water over the west dike in the creek. Except in extremely wet weather, one 1,100-g.p.m. pump can handle all the infiltration. During the infrequent spells of dry weather the water level in the ditches is deliberately kept high to moisten the sand base of the runway, thus reducing blowing of the sand under high winds.

The new airport was still vulnerable to flooding from the hills to the west, so a whole new dike was built for two miles along the west side by bulldozers, scrapers and draglines. The overlying tundra peat was used as a core, covered with sand. This new dike was carried to El. 9, to withstand a flood superimposed on a high tide. It was made 24 ft. wide on top to serve as a roadway. Sweeper Creek was then diverted to the bay to the north through a 700-ft. intercepting

One of the difficulties in building airports in the Aleutians is finding a level spot. At one island it was necessary to build a sand fill 50 ft. high, drained by a big wood-box culvert, to carry one end of the runway.

A lake had to be drained and the soft, soupy bottom material removed with a dragline before a runway could be built at one Aleutian island.

canal and through a ditch formed by the borrow pit of a 1,400-ft. extension of the new west dike.

The march continued westward. Next to be established as a main airbase was Amchitka, lying only 65 mi. east of Jap-held Kiska. Here the initial landing was Jan. 12, 1943, and the engineering forces, landing with the task force, jumped right into airport construction. Again a tide-swept, low-lying valley, much narrower and smaller than the one at Adak, was selected for the first runway site. A sand fill raised the lower end of the valley above tidewater level. Because this base was within easy bombing range of Kiska enemy bomber raids interfered with rapid construction, so it took about a month to get the first strip built and ready for operation.

Plank only at runway ends

A new system of runway surfacing was tried here, consisting of pierced plank steel surfacing at the ends of the landing strip where planes take off and land, and a sand section in the center stabilized with calcium chloride to make it firm and solid. Several members of the engineer forces lost their lives in Jap bomb raids while building this field.

After the first strip was completed, permitting the basing of a fighter squadron, the next attack by Japanese planes was beaten off and the Japs never came back for more.

Working under protection of a fighter squadron at Amchitka, the engineers built two more strips on another location suitable for bomber operations. The longer one of these was surfaced entirely with steel plank but the shorter cross runway was built with steel mat only at the ends, where the planes landed and the center was surfaced with crushed rock. Fortunately, Amchitka offers excellent rock beneath its cover of tundra so a quarry was quickly opened for supplying rock for runways and roads.

We hammered Kiska repeatedly in bombing raids from nearby Amchitka, and then on May 11, 1943 pulled a surprise move by making an end run instead of a center rush and invaded Attu, the last island in the chain the other side of Kiska. Here again we rapidly built another steel-paved step on the springboard to Tokyo. In short order, the engineers with heavy grading equipment created a suitable runway fill, while slapping the steel mat in place was only a matter of hours.

Details of construction and design, dimensions and exact locations of many of the air bases cannot be revealed at this time. Still, enough has been pointed out to indicate that despite rugged terrain, soft ground, wretched weather and the supply problem, our steel-paved steps to Tokyo represent a construction achievement of note.

Baltimore Collects Union Dues of Public Works Employes

An unusual system under which Baltimore collects union dues of per diem employes of the municipal public works department and turns the money directly over to the labor union now is in effect. The union pays the city costs of collecting the dues, the International City Managers Association reports.

A new agreement, drawn up to eliminate the court's objections to a former similar contract between the city and the union, recognizes the union as the sole bargaining agency for all employes as a group but does not deny the right of individuals to bargain with the municipality. The city collects union dues as a salary deduction when requested by the employe; the union reimburses the city for any additional accounting expenses incurred in making the deduction from the payroll.

Machinery for arbitration of disputes is set up, but the authority of the department head to settle grievances and to hire and fire employes is recognized. The closed shop and the right to strike are outlawed specifically in the contract. An interim court opinion held this contract "not invalid on its face." A taxpayers' suit challenging the authority of the city to deduct dues for the union still is pending in court.

The first payment made to the union amounted to $5,593 and was for dues of 829 workers from April 8 to June 30 and covered advance dues to July 31. By June 30 the city's central pay-roll had collected union dues totaling $11,020. However, the court ordered the portion of this amount collected under the original agreement refunded to workers.

Dues collected after April 7 under terms of the new agreement were paid the union. Collections from all workers authorizing the $2 monthly deductions cost the city approximately $6 which has been refunded to the city's pay-roll bureau by the union.

Long Span Laminated Timber Arches For an Aircraft Hangar

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***Contents in Brief**—Three-hinged laminated arch ribs of 7½x36-in. cross-section and 171-ft. span serve as the principal framing for a timber aircraft hangar. A horizontal overhead truss of 20-ft. depth and spanning the full width of the hangar at the front end accommodates the wind loads on both ends of the structure. The door leaves of the main opening operate at the floor in timber guides that may be adjusted if necessary to accommodate changes due to shrinkage of the timber framework.*

AN AIRCRAFT HANGAR of timber construction at Hagerstown, Md., claims attention because of the long span of arch ribs employed, the procedure followed in designing the arches, and the method employed to accommodate wind loads on the ends of the structure.

The hangar is 171 ft. wide, 120 ft. long, and 48 ft. high inside. A 21-ft. wide two-story lean-to along one side provides space for repair shops and offices, but reduces the effective inside width to 150 ft. Wooden doors rolling back into pylons at the sides provide a 27 x 135-ft. clear opening at the front end of the structure.

Since the headroom at the sides of the hangar would have been reduced too much, the most economic curve of an arch—a parabola—could not be used in laying out the arch ribs. Instead, the arches, which are on 10-ft. centers, follow the outline of a three-centered circle, in consequence of which a bending moment of 245,000 ft.-lb. is developed about 14 ft. from the supports. In accordance with War Production Board regulations, the arch was designed for 75 percent of the normal snow load of 30 lb. per sq. ft., which resulted in a total uniform design load of 480 lb. per lin. ft. of arch rib.

The typical rib was detailed as a three-hinged arch of 7½ x 36-in. uniform section. Kiln-dried, glued laminated timber was specified to accommodate the high stresses deemed advisable. A basic stress of 2,333 psi. for combined bending and compression was permitted by the specifications of the Forest Products Laboratory, U. S. Department of Agriculture (Technical Bulletin 191); when this basic value was modified by the so-called "depth factor," the permissible stress was close to 2,000 psi.

Arches all of same design

Carrying a horizontal wind truss and the door guides, the two front arches of the hangar were designed for a total uniform load of 800 lb. per ft., or almost twice the loading of the typical arch. Instead of using arches of greater cross section to accommodate the increased load, a horizontal 6 x 8-in. wood tie about 29 ft. above floor level was provided in the vertical plane of each of these two members. By means of these ties it was possible to use the typical arches

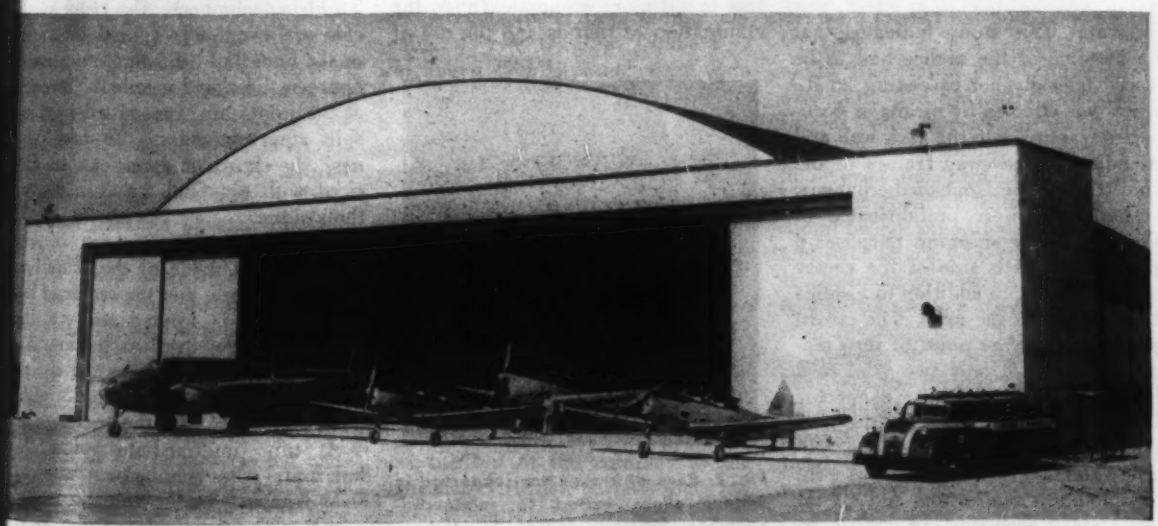


Fig. 1. Principal framing of this timber hangar consists of laminated arches of 171-ft. span on 10-ft. centers.

Fig. 2. Wind loads on both ends of the hangar are resisted by a rigid horizontal truss at the open end of the structure. The truss is supported at frequent intervals by sway frames attached to the two end arches.

throughout, and thereby simplify construction. Designed for a tension load of 45,000 lb. each, the ties are at the level of the wind truss and do not reduce the overhead clearance.

Of interest is the fact that the moments in the arches all are negative, making the bottom and not the top of the arch in compression for its entire length. As a result, a careful investigation of the buckling effect was necessary. This study indicated that the bottoms of the arches had to be braced laterally not exceeding 28 ft., which was effected by means of 6 x 6-in. ties framing into the back wall and extending to the sway frames of the wind truss at the front of the hangar.

The arches were prefabricated in Wisconsin. For shipping purposes a splice 30 ft. each side of the center was introduced, in addition to a splice at the crown of the arch. The crown splice, being at the point of zero moment, consists of only two $\frac{3}{8}$-in. steel side plates with six shear connector rings on each side, while the two side splices, which had to develop a moment of 63,000 ft.-lb., consists of $\frac{3}{8}$-in. steel plate top and bottom and a $\frac{3}{8}$-in. steel plate at each side lag screwed to the arch.

The horizontal thrust of the typical rib is 37,000 lb. By using three 1-in. round tierods between the two footings of each arch, reinforced footings of only 3 ft. by 4 ft. 6 in. mat area were of sufficient size to support the arch ribs. The ties are welded at the splices and are protected against corrosion by being embedded in the concrete floor slab. This arrangement was found more economical than the elimination of tierods and the use of

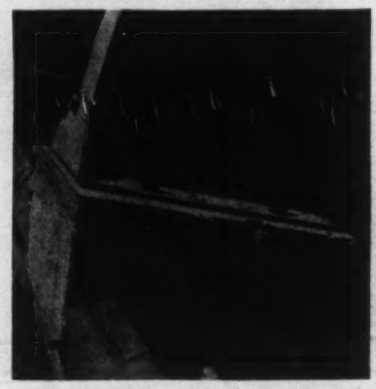


Fig. 3. Ends of arches are supported in welded shoes bolted to reinforced-concrete footings joined by tiebars embedded in the concrete floor.

footings designed to resist the horizontal thrust.

The horizontal wind truss at the front of the hangar spans 171 ft. and is 20 ft. deep It is designed for a total wind load of 66,000 lb., which results in chord stresses close to 90,000 lb., and about half this stress in the end diagonals. The chords consist of two 2 x 14-in. timbers and two 3 x 14-in. members; the truss verticals are two 3 x 14's; and the diagonals one 3x14-in. timber inserted between the chord members. Stresses at the joints are transmitted by 4-in. split ring connectors. To add stiffness, the chords and verticals are latticed with diagonal 2 x 4's nailed to their sides.

The center of one chord is projected 5 ft. outside of the centerline of the first arch, and the center of the other chord is located between the second and the third arch (Fig. 4). This arrangement enables the chords to pass to the outside supports without interference with the arches.

At nine intermediate points the horizontal truss is hung or strutted by sway frames from the first and second arches. The verticals of the truss form the bottom of the sway frames

support the top guides of the ng doors. Two heavy vertical X es in the outside wall of the door ns support the ends of the truss transfer the wind load from the into the footings.

he top door guides are made of 7½-in. maple strips bolted to a e consisting of two 2 x 8-in. ds on each side and a plywood om stiffened by 2x 8-in. joists 16 on centers and perpendicular to guide strips (Fig. 4). The ma- strips are laterally stiffened by 8-in. boards glued to the plywood tom. These frames, which were fabricated in lengths correspond- to the distance between truss ver- ls, are connected to the verticals 1-in. dia. hanger rods, a vertical arance of 4 in. between the truss d the frames being provided.

Guides are adjustable

Since the top of the hangar rods e readily accessible, it will be pos- le to raise and adjust the guides turning the nuts, in case the roof gs slightly due to shrinkage of the od or from other reasons. It is t that this arrangement, together th the turnbuckles provided in the ngar rods supporting the outside ord of the wind truss at the five ay frames, provides sufficient ad- stment to guarantee satisfactory or operation.

To transmit the wind-load from the or guide panels to the wind truss, x 4-in. timber struts were fastened the guide frames after their erec- n. These struts fit tightly between e 6x8-in. arch tie and the short x 8-in. bumper pieces bolted to the uss verticals close to the truss ord. To secure a safe load transmis- on the tie is backed up with bumper ces at the truss verticals (Fig. 4).

The door panels—of 6-in. overall ickness — consist of glued lami- ted wood frames covered on both des with plywood. Hand operated, e door panels move on steel rails at or level; at the top the panels are uipped with lateral rollers moving ong the door guides. During a full ar of operation the doors have used no trouble.

No arch is used in the plane of the ck wall of the hangar, which con- ins wooden columns spaced 12 to ft. apart and carrying light roof ams and the wall framing. In view the maximum height of 48 ft.,

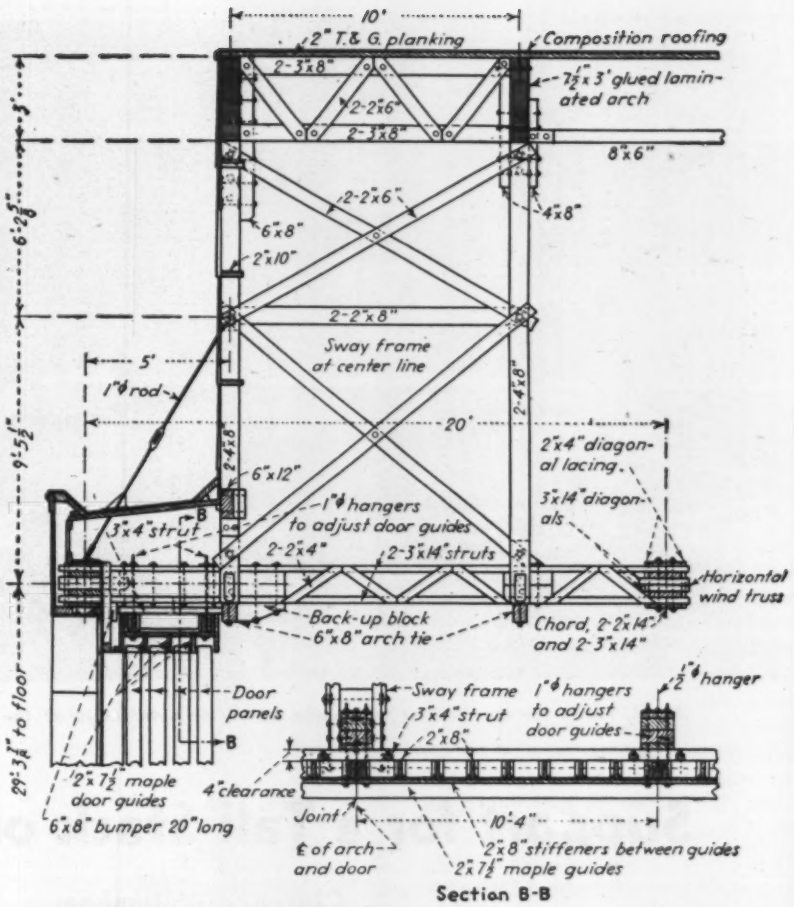


Fig. 4. Guides at the top of the door leaves at front of hangar are suspended from the horizontal wind truss, which projects about 6 ft. beyond the end arch rib. If necessary, due to shrinkage of timber or for other reasons, the bolts supporting guides may be tightened to provide more space above doors.

built-up columns were used instead of solid sections, the highest column consisting of two 8 x 10-in. timbers to which two ½-in. plywood webs were glued—one on each side—to form a box-like section 3 ft. 6 in. deep. The shorter columns are correspondingly reduced in size.

The wall framing consists of horizontal 2 x 8-in. timbers or 2 x 10's, depending upon the span, spaced about 4 ft. on centers. Between these girts 2 x 4-in. studs on 16-in. centers are used. The covering for the end wall is the same as on the side walls, consisting of ¼-in. asbestos siding nailed over ¾-in. insulation sheathing.

Horizontal box-like beams connect the top of the columns to the nearest arch, which permits the wind loads at the top of the back wall to be transmitted to that rib and forward to the horizontal wind truss at the front. In this way the truss takes the wind loads from both ends of the building.

For the roof a 3-ply composition over 2-in. T&G planking was used. On the side opposite the lean-to the roof does not follow the arches to floor level but turns outward at a height of about 17 ft. to rest on horizontal beams supported by the arches and outside 2 x 6-in. stud walls. This arrangement provides a maximum of usable floor space between the arch ribs.

Norman J. Early, Hagerstown, Md., was the general contractor. All the structural members were fabricated by Unit Structures, Inc., Peshtigo, Wis. Plans and specifications were prepared by Albert Kahn Associated Architects & Engineers, Inc., Detroit, Mich. The owner is the Fairchild Engine & Airplane Corp.

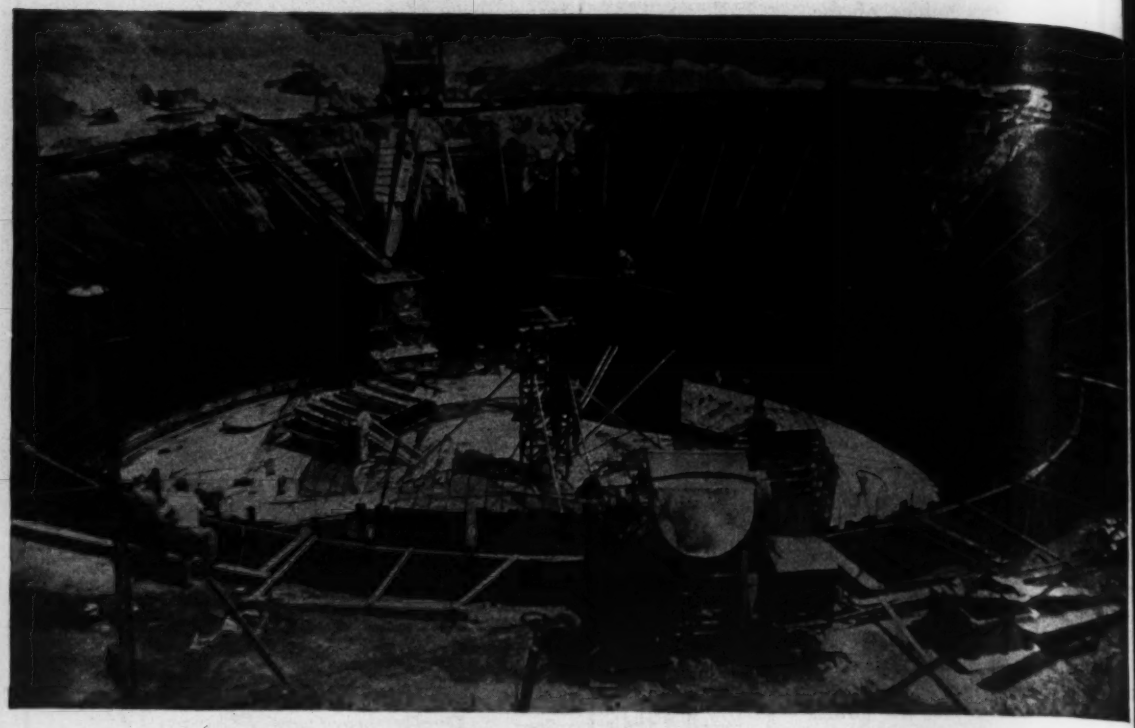


Fig. 1. Forms for the circular wall being set at the outer edge of the spread footing of the stack.

Support for a Tall Stack on Poor Soil

Clarence W. Dunham
Structural Engineer, Phelps Dodge Corp., and
Associate Professor of Civil Engineering, Yale University

***Contents in Brief**—The foundation materials under a 540-ft. reinforced-concrete stack were of such unstable nature as to call for a floating foundation and for equalization of the superimposed load by removal of the overburden. Acid-bearing groundwater also complicated the foundation problem. The completed foundation consists of a heavily reinforced concrete slab at the bottom of a large shallow well formed by a wall at the outer rim of the circular spread footing. Membrane waterproofing protects the whole structure against attack by the acid water.*

UNUSUAL CONDITIONS sometimes lead to unusual remedies. This is exemplified in the design of the foundation of the 540-ft. reinforced-concrete stack that serves the roasters and the reverberatory furnaces of the Copper Queen Smelter of the Phelps Dodge Corporation at Douglas, Ariz. The completed stack is founded upon numerous strata of sands, clays, silts and gravels which, as reported from local well-drilling operations, extend to a depth of at least 1,000 ft. Some of those within the zone of high foundation pressures were of such low bearing value as to result in a foundation design of unusual character. This design combines a spread footing of sufficient area to insure against unequal settlement due to variations in the character of the soil on which it rests and removal of enough overburden to about equalize the load that the stack would otherwise have placed on the deeper beds of soft clay. Acid-bearing groundwater added to the design complications.

The new stack replaces two 300-ft. steel stacks located about 620 ft. apart, which were in such bad condition as to call for early replacement to prevent interruption of the flow of copper to war industries. Local conditions fixed the best location for the new stack at some point about midway between them. The height of the new stack, in turn, was fixed by Arizona authorities, who insisted that any new stack be practically as high as the 565-ft. stack built in 1941 to serve the converters at the smelter. That stack is 440 ft. from the new one and on somewhat lower ground. It is founded on a lense of gravel that is partially cemented together, forming caliche or a sort of weak conglomerate. No trouble was experienced during its construction, and none has developed subsequently.

Exploration of the site for the new stack was begun in 1941. Three

its were dug through the 20-ft. r of slag overlying the natural und and about 10 ft. into the ral soil. Two borings also were e with a well-drilling outfit. No sturbed samples were taken. The ings are shown in Fig. 3a. Con- rable water containing sulphuric and copper sulfate was found the slag just above the adobe, reas the groundwater below this be was pure.

Initial foundation studies

No lense of gravel comparable to supporting the other large stack found. Consequently, the first ndation design to be studied was lain concrete mat 4 to 6 ft. thick ced directly on the adobe. By ilding the spread footing of the ck on top of this, the former uld be raised above the ground- ter level where the concrete and nforcing steel would not be sub- t to attack from the acid water. owever, a load test on this adobe roved it to be unsatisfactory as the aterial was wet and plastic and wed out from under the bearing ate. This indicated that the hoped- r bearing resistance of 3 tons per . ft. could not be attained.

On this account a pile foundation as studied next, using about 570 ncrete piles 30 ft. long with an sumed safe load of 30 tons each. this case the base was to be raised bout 10 ft. above the top of the dobe to get it out of danger from e acid-bearing water. The tips of e piles were to penetrate to about l. +5 (Fig. 3a). When a cross- ction of this pile design was drawn show the entire stack, the soil rata and the relatively "tiny" piles scale, it became evident at once at the piles would do little good ecause they would merely deliver eir loads to the tapered clay strata.

A glance at Fig. 3a shows that ompression of the varying thick- esses of these clay layers would lmost inevitably cause unequal ettlements, which would in turn ause tipping of the stack. Inasmuch s the motion of the top would be bout seven times as great as the ifferential settlement of opposite dges of the footing, it was deemed dvisable to reexplore the soils be- ore deciding upon the design of the tructure. Furthermore, the informa- ion shown in Fig. 3a did not seem

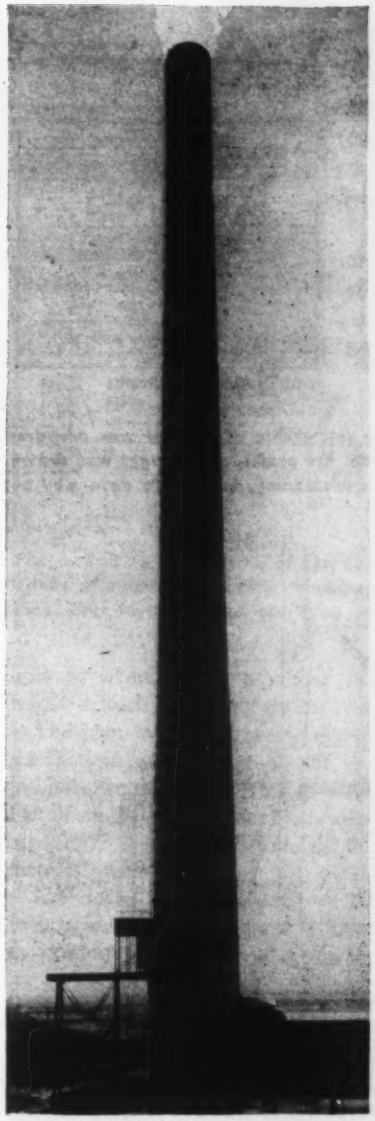


Fig. 2. Towering 540 ft. above the top of its base and supported on a low-bearing soil, this stack required extensive foundation studies before a satisfactory method of support was chosen.

to be a natural, reasonable condition. Even if it proved to be correct, the characteristics of the soils—particularly the clays—should be ascertained because, if they were highly compressible, and if the strata were tapered and deep, it would be almost impossible to prevent serious tilting of the structure.

New borings taken

To gain more complete knowledge of the soil conditions, four new borings were made about 35 ft. from the proposed center for the stack and roughly at the quarter points around the circle. Two others were taken, one about 100 ft. east and another 75 ft. to the southeast of the center of the site.

These soil samples were tested in the soils laboratory at Yale University.

A north-south profile plotted from the log of the new borings is shown in Fig. 3b. It indicates that the strata are not tapered as shown in Fig. 3a.

The log of the borings east and southeast of the desired site indicated that nothing was to be gained by shifting the stack in that general direction.

For about 30 ft. below the adobe the various strata proved to be reasonably firm and relatively incompressible; furthermore, the two layers of red clay were quite impervious. The top stratum of sand and gravel consisted largely of fines with some clay and small pebbles. All these strata together formed a sort of earthen slab over 30 ft. thick, which seemed to be fairly strong and reliable in its natural, undisturbed state. However, under these strata the 10-ft. layer of soft, whitish clay had a consistency and appearance approaching that of well-mixed putty. Its moisture content exceeded 30 percent, and its bearing value was of low order unless fully restrained.

Although the strata below this white clay were strong, they were so deep that piles long enough to reach them would be needlessly expensive. Hence, the idea of using piles was abandoned and study was concentrated on some form of floating foundation that would disturb the natural soil conditions as little as possible.

Floating foundation studied

In the initial study for this floating foundation the bottom of the spread footing was located on the first bed of sand and gravel at about El. +13 (Fig. 3b).

Inasmuch as the 20-ft. layer of slag on the surface of the natural ground had been in place for many years, it seemed probable that appreciable settlement of the underlying strata due to this surcharge had ceased, and that the slag itself would also be useful as a blanket in preventing flow of any plastic soils from underneath the structure. Moreover, the soil tests seemed to show that the materials just under the adobe could

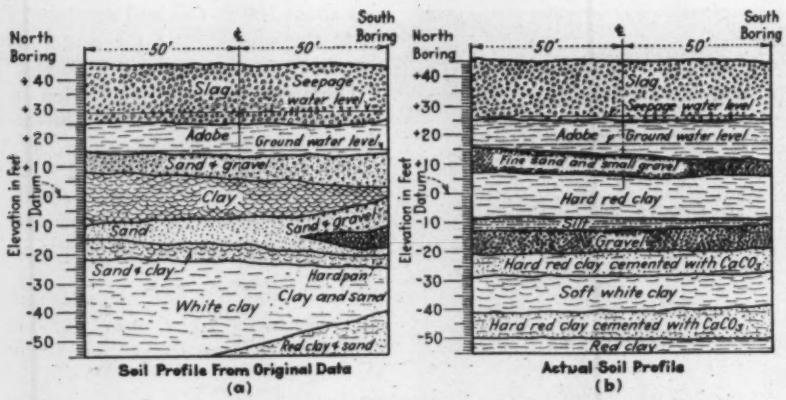


Fig. 3. Based upon the original borings the soil profile at the left was prepared Later, after four new borings had been made, the profile at the right was drawn. Comparison of the two profiles shows how misleading inadequate data may be.

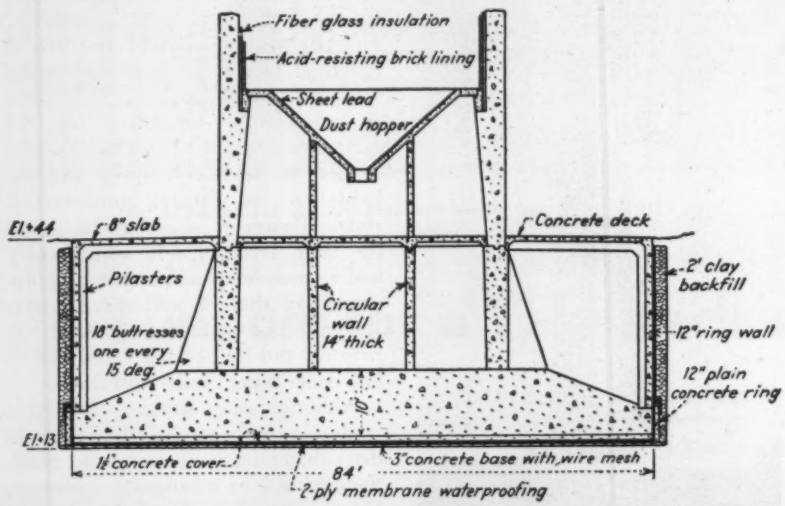


Fig. 4. The original floating foundation designed for the stack called for an 84-ft. dia. spread footing located on sand and fine gravel 30 ft. below the surface.

Fig. 5. Corrugated iron troughs were installed to intercept the groundwater flow at the bottom of slag and carry it to the pump sumps without permitting the water to reach the excavation site.

safely withstand a maximum pressure of 3.5 tons per sq. ft. at the edge of the base for a combination of dead load and a wind pressure of 30 lb. per sq. ft. of vertical projection of the stack, considering the beneficial effect of the heavy slag overburden.

The next thing to be determined was the diameter of the base, using this 3.5 tons per sq. ft. as the maximum permissible edge pressure. If the adobe and slag were to be backfilled over the spread footing, their weight necessitated a diameter of approximately 110 ft. to meet this condition. As such a large base would be costly, it was decided to eliminate this heavy, useless dead load of the backfill above the footing, supporting the surrounding soil by a circular concrete wall at the outer edge of the footing, as shown in Fig. 4.

The weight of the slag and adobe removed from above the plane of bearing at the bottom of the base would be nearly equal to the dead load of the entire structure, thus producing no material increase in pressure on the underlying strata. The effect of wind was considered to be so temporary, so variable in direction and so small in magnitude that the resulting inequalities of pressure would not cause the underlying materials to flow or permanently compress, because their impermeability, shearing strength and cohesive resistance were too great to permit relatively rapid changes.

The problem of protection against the acid-bearing groundwater was solved by using membrane waterproofing as illustrated in Fig. 4. If the chemicals attacked the concrete outside of the waterproofing it seemed that nothing worse could result than its conversion to a sort of sand and gravel layer still capable of transmitting the necessary pressures.

Design changed again

Work of completing the excavation was started in June, 1942. When the slag was practically all removed and some of the adobe had been excavated to about El. +17, groundwater began to soften the adobe so badly that the digging of two sumps just outside of the future rim of the base was started to permit pumping out the water as fast as it entered. By the time these sumps had been excavated to El. +14, the ground-

ater below the adobe caused the ottoms to blow up and the water to se to about El. +15, which was 2 above the proposed elevation of e bottom of the base. Fear of com- ete disintegration of the bottom of e pit if carried to the intended ele- tion caused cessation of work.

The groundwater in the slag was heavily charged with acid that me had to be dumped in the sumps neutralize it and thus to avoid mage to the pumps.

The next problem was to intercept e groundwater at the bottom of the ag and to carry it to the sumps di- ctly without letting it reach the cavated area. Although the slag as broken into small pieces, the rticles seemed to be well inter- cked so as to give the slag layer nsiderable shearing strength. herefore, it was considered safe to ndermine the edge to permit instal- tion of corrugated iron troughs to tercept the flow and carry it to the mps. These were successfully com- leted (Fig. 5). As soon as the mps were again working, the proc- ss of drying up the excavation was rted.

Wellpoints considered

In the meantime, the elevation of he bottom of the base was tentatively rdered raised 3 ft. to El. +16, that eing slightly above the level reached y the groundwater rising in the mps, and just under the deepest art of the excavation already made. was thought that the weight and mpervious nature of the adobe would e sufficient to prevent blowing up f the bottom when the excavation to hat depth was completed.

The use of well points to remove he groundwater from the top stratum f sand and small gravel shown in ig. 3b so that the base could be ept at its original elevation was onsidered, but the plan was aban- oned for the following reasons: hat layer contained a large amount f very fine material that might be ashed out by the flow of water to he well points, the quantity of wa- r to be handled was completely un- nown, and laboratory tests indi- ated that the action of the artesian ater was likely to disintegrate this yer seriously, the performance of he soil at the bottoms of the sumps eeming to substantiate this latter onclusion. Furthermore, it seemed

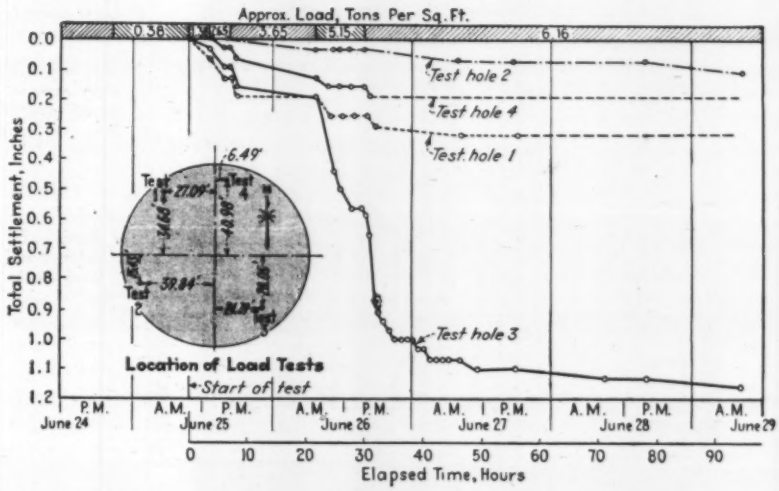


Fig. 6. Raising the bottom of the base 3 ft. required that the structure rest on adobe of uncertain bearing capacity, which made load tests of the adobe desirable. Four tests, spotted as shown at the left, supplied the data above.

wise to avoid doing anything that might disturb the lower strata.

The plan to raise the elevation of the bottom of the base meant that the base would have to rest on a few feet of adobe of questionable bearing capacity. Hence, load tests of this material were started.

Inasmuch as the design of the foundation was based upon utilizing the holding-down pressure of the materials outside of the footing itself, the tests were to take this feature into account. If they were made directly on the surface of the adobe, it seemed that such a plastic material would certainly flow out from under the loaded areas and that any such test would show far less applicable results than would a test made with some reasonable depth of material surrounding the loaded area.

Fig. 7. To test the bearing value of the adobe, a circular plate having an area of 2 sq. ft. and surmounted by a 12-in. dia. pipe was placed inside a 20-in. pipe and loaded with pig lead. Settlement readings were taken before and immediately after the application of each load increment.

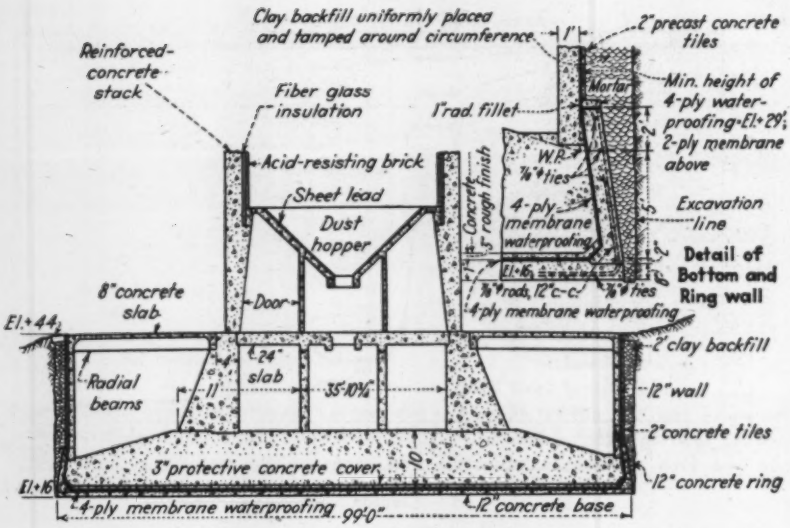


Fig. 8. Details of the foundation as finally constructed. This base was designed to support the stack without increasing the load on the supporting soil. Special care was taken to minimize possible damage to the concrete from the acid-bearing groundwater.

Therefore, the following procedure was adopted: (1) Make the tests so that the loaded area would be at El. +16, the assumed new elevation of the bottom of the concrete; (2) Test a loaded area of 2 sq. ft.; (3) Apply the load at the bottom of a hole 3 ft. deep below the adobe surrounding that vicinity; (4) Make four individual tests, locating them as near the quarter points of the pit's perimeter as possible under existing conditions; (5) Take load-settlement readings for all tests; (6) Assume that a settlement of one inch constituted failure of the soil; and (7) Allow sufficient time to assure that the settlements under each increment of load practically ceased before applying the next one.

The points for testing were chosen at the locations shown in Fig. 6. The immediate vicinity of each was leveled off at El. +19.

The plant engineers made the loading masts. Briefly, they consisted of a circular steel plate, 2 sq. ft. in area, at the bottom of a 12-in. steel pipe surmounted by a timber loading platform on a steel frame. The holes in which the tests were made were lined by sinking 20-in. steel pipes to the desired depth, after which the bottoms were smoothed off and a little dry sand sprinkled in and leveled. Loading masts were then erected, plumbed and rotated to get even bearing on the sand. Each mast was held vertically by installing six greased 2x4-in. wedges cut to proper size. These bore against the outer shell but did not hamper vertical motion of the mast.

In order to get settlement readings, a scale was attached to each mast, then a fine wire was stretched across two stakes and counter-weighted. To check the scale readings, and to avoid losing the value of a test in case something happened to the scale or wire, a hole was cut in the wooden platform so that a level rod could be set on the top of a cross-arm over the center of the mast.

The material encountered in the excavation of the test holes was about as follows:

No. 1: Adobe changing to a mixture of small, wet gravel and dark, coarse sand near the bottom of the hole.

No. 2: Reddish-soil, relatively dry and seeming to contain a sort of skeleton of cemented materials. It had hard spots and veins that appeared more whitish than the rest of the ground.

No. 3: Dense, dark red, plastic adobe for the full depth. The material was wet, but relatively impermeable. This soil was far softer than that encountered in the other holes.

No. 4: The bottom consisted of a mixture of red clay and coarse sand, but it was not as coarse and wet as the soil in No. 1.

When the test equipment was all set in place, an initial load of about 500 lb. per sq. ft. was applied, using pig lead as shown in Fig. 7. This load was allowed to remain all night to be sure that all slack was taken up. Thereafter, readings were taken just before and immediately after the application of each major increment of load.

Time-settlement curves for all of the tests are shown in Fig. 7. Test Pit No. 3 proved to be the critical one. The soil carried the load fairly well until it was increased to 5 tons per sq. ft., whereupon the adobe started to yield badly. Its settlement was recorded every two or three hours all through the following night. The other three test areas were later loaded to 6 tons per sq. ft. Although they held fairly well, it was evident that Test Pit No. 3, which represented the general condition along the east and south sides, would control the maximum allowable pressure

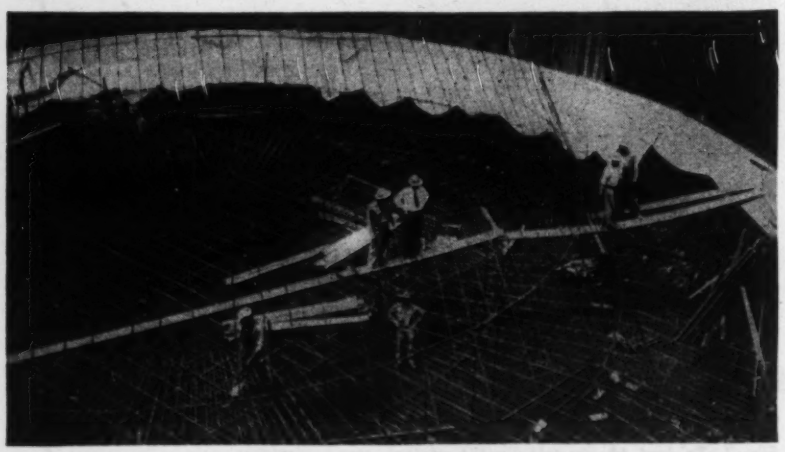


Fig. 9. The spread footing of the foundation is heavily reinforced, that for the bottom mat consisting of one layer of radial rods and four sets of parallel bars, 60 ft. wide, arranged at 45-deg. intersections.

be assumed in revising the design, ultimate load being taken as 5 ons per sq. ft. The test loads were ft on for another 48 hr., to make re that serious progressive settlements did not occur. Furthermore, ur additional test pits were dug to cate the full extent of the adobe at e elevation of the bottom of the se. In general, the results of the ld tests of the adobe were higher an those made in the laboratory.

Design again modified

The entire problem was now reiewed. The urgency of the work, because of the dangerous condition of e reverberatory stack, and the apparent economy of the single stack, ade it seem advisable to modify the esign to make the structure safe at e chosen location. Of course, the xistence of relatively firm materials one-half of the excavation, whereas e other half was weak and very lastic, seemed to be just about as ad a condition as one could find for e foundation of such a heavy, tall, ender structure. Obviously, the dimeter of the base should be increased.

The maximum allowable pressure r dead loads was assumed to be 2 ons per sq. ft. This was to be practically the same as the estimated eight of the materials that would be emoved above El. +16, the selected osition for the bottom of the base. he maximum allowable total pressure under one edge of the base for ead load plus wind was set at 2¾ ons per sq. ft., giving a safety factor of nearly two with respect to the ailure of the soil under test.

Considering the fact that the dimeter of the existing excavation in he slag was about 100 ft., a total iameter of the base of 99 ft. was hosen, tentatively found to be satisactory, and approved as the starting oint for the new design. The final esult is shown in Fig. 8. Since the eight of the base would be about alf the total weight of the stack, it eemed probable that this load would ake up a lot of the settlement due to ecompression of the soil if it tended o rebound somewhat after the excaation was made and then to settle gain as the load was applied.

There was a real possibility that he almost vertical face of the adobe ould not continue to stand up unr the slag if softened by groundwater or rain. Therefore, the concrete protection below the membrane waterproofing, and the ring wall outside of the edge of the footing were made heavy enough to form a strong "pan" at the bottom of the excavation. Once they were in, the bottom would be protected and the ring would help hold the adobe in place.

A detail of this very important feature is shown in Fig. 8. The ring was reinforced to act as a retaining wall; the edge of the slab also was reinforced so that it cantilevered beyond the edge of the heavy footing, thereby making the full 99-ft. diameter effective. The work was carried on in individual sectors in order to minimize the area exposed at any one time. After completion of the "pan", the greatest danger was over.

A few of the features shown in Fig. 8 should be noted. To reduce the cantilevered portion of the footing the lower part of the stack was belled out in a solid ring instead of using buttresses as in the early designs, the top of the belled portion being supported by a 24-in. concrete slab to resist the inward thrusts at the top. The "tank" wall was supported laterally by the concrete deck.

The membrane waterproofing of the "pan" was applied on the inside whereas that above the ring wall was placed after the completion of the concrete ring wall. The upper waterproofing was protected on the outside by large, precast concrete tiles, unreinforced and 2 in. thick, laid in mortar. The space between them and up to the face of the slag was backfilled with clay to minimize the penetration of water. A sump was built in the top of the footing in case leaks occurred. A manhole and ladder were provided to permit inspection.

After completion of the base, levels were taken once a month to ascertain what settlements occurred and whether or not they were uniform. The results to November 1943 show an average settlement of about ¼ in. The greatest differential settlement across the east-west diameter is ¼-in.

The tests of the soil samples and the interpretation of their significance were made by D. P. Krynine, research associate in soil mechanics at Yale University. In the planning and conduct of the testing and redesign work carried on at the plant in Douglas, the following men were of special assistance: Stewart Carpenter, general plant foreman, and E. C. Robinson of the Copper Queen Branch, Phelps Dodge Corp.; L. Clark Rankin, superintendent for the W. A. Bechtel Co., the contractors for the foundation; and Eric Plagwit and H. V. Arnold of the Rust Engineering Co., the contractors for the stack itself. In the engineering department of the Phelps Dodge Corp. at New York the writer was assisted by Arne Lier and Arthur L. Otto.

Garbage Disposal in Iowa Cities

A survey of garbage collection methods in Iowa cities over 20,000 population shows that all cities require householders to use more or less uniform water-tight containers of a specified type and size. However, methods of disposing of garbage vary widely, according to the American Municipal Association.

In Des Moines the department of streets collects garbage. The service is paid by special levy with no charge to the householder and the garbage is sold to hog feeders.

Seven separate contracts are let for garbage collection and financed by taxation in Sioux City. Garbage, rubbish and ashes are picked up from residences; hotels and restaurants, must remove their own. Davenport authorizes the department of public works to collect household garbage. Collections are financed by taxation, and the garbage is disposed of by the landfill method.

Cedar Rapids collections are made by department of health trucks and the garbage burned in an incinerator at the sewage disposal plant. The Dubuque contract also is let under supervision of the health department and financed by a special tax levy.

The Ottumwa sanitary department supervises the three private companies which make collections from residential areas at a charge of 50 cents a month.

In Clinton the city collects the garbage, financing the work by taxation. Method of disposal is by burning in incinerators. A private collector is used in Burlington. The service is financed by taxation, and the city sells the waste to hog dealers.

Fig. 1. Steep banks that offer little resistance to erosion were flattened as a preliminary to laying the revetment.

Revetting a River Bank at High Water

***Contents in Brief**—Army Engineers perform emergency job of bank protection on the Mississippi River by sinking an articulated concrete mattress along the rapidly receding river bank. Abnormally high water and swift currents made the job difficult.*

ANOTHER ROUND HAS BEEN WON in the eternal battle to keep the Mississippi River within the confines of its levees. Its latest attempts to go meandering off from a prescribed course near Goodrich, La., was quickly checkmated when the Army Engineers stepped in and sank 3,000 lin. ft. of articulated concrete mattress along the threatened bank on the Louisiana side of the river.

Although bedeviled by high water and swift currents, the job was completed in 20 days, working two 10-hr. shifts per day. Spring rains along the river's upper tributaries had raised its crest 20 ft. above normal stage. Added to this, was the difficulty of battling an 8-ft. per sec. current. But in spite of these adverse conditions the river bank was graded to the proper slope and successfully blanketed with a protective layer of reinforced concrete revetment, the outer edge of which was submerged in 80 ft. of water.

Completion of this revetment work at Goodrich Landing affords protection for a controlling section of the main-line levee which sets back only 900 ft. from the river bank.

The trouble all started during low water last year when the Mississippi changed its natural course a short distance upstream. At the same time it brought great quantities of sand downstream to form a sand bar slightly upstream and across from the site of the revetment work. This decreased the effective channel section, increased the river's velocity and stepped up the rate at which the river bank was caving.

Another contributing factor to this excessive bank caving stems from the river's action some 2 or 3 miles upstream. By some freak of its channel-changing nature, the greater portion of the river started flowing to the right of a large island called Cottonwood Bar. This change in flow caused considerable recession of the right bank a short distance below the island.

From this point below Cottonwood Bar the river again formed a single channel which, aided by the newly formed sandbar, directed a severe attack against the right bank at the scene of revetment operation.

Original revetment lost

Within the past two years, the original revetment at Goodrich Landing was destroyed by the scouring action of the river. Also, a 1,000-ft. recession occurred in the west bank, with the last 500 ft. taking place in recent months.

The direction and magnitude of the scouring action gave every indication that the rapid recession of the west bank would continue, and at an increasing rate. Since there are only 900 ft. of foreshore between the levee and the river, the immediate installation of the articulated concrete mattress was considered imperative in order to protect the controlling levee at that point.

With speedy installation being of paramount importance, the revetment work was attacked simultaneously on two fronts, although at widely sep-

ted locations. While the caving
er bank at Goodrich, some 30 mi.
stream from Vicksburg, Miss., was
ng graded and prepared to receive
concrete mat, a huge government-
ned casting plant at Greenville,
ss., about 100 mi. upstream, was
y casting the thousands of con-
te blocks to form the articulated
ttress. (For a full description of
block casting and laying plant see
R Dec. 25, 1930, p. 996.)

Casting the blocks

Concrete blocks for the articulated
ttress were cast directly on barges
shipment to the revetment site.
ch block measures 14 in. wide, 3
thick and 4 ft. long. They were
t in units of 20 blocks each. By
ving a 1-in. crack between blocks
h unit has a laying area 25 ft. long
d 4 ft. wide for a total of 100 sq. ft.
Blocks are not rigidly reinforced
t they are tied together in pairs,
th 0.18-in. dia. steel wire hoops.
ds of hoops were left exposed for
stening them with twist wires to
nching cables anchored shore-
rd and running between each row
squares.

Casting the concrete blocks was on
mass production basis due to well
signed equipment and experienced
erators. Speed of production in
s operation was of the greatest
portance since it was imperative
t the concrete mattress be deliv-
ed at the job by the time grading
erations were finished.

Blocks were poured in steel forms
rectly on the barges. Forms were
osened as soon as the concrete had
ken its initial set, and removed at
e end of 4 hours. They were then
aned with wire brushes, sprayed
th oil to prevent bonding to the
ncrete, and placed on top of the
eviously poured blocks ready for
e next batch of concrete. Each
er of blocks was covered with one
ckness of heavy paper to prevent
nding to the next concrete pour.

An average barge load contained
0 of the 100-sq. ft. units, totaling
00 concrete blocks. They were
t in 20 stacks, each being 15 layers
gh. Casting operations employed
0 men working one 10-hr. shift per
y, 6 days a week. The entire revet-
nt project required 9,560 of the
0-sq. ft. units or 32 barge loads.
sting was started on March 10 and
ished on March 22.

With the Mississippi River swollen to within a few feet of the top of its banks, most of the grading was subaqueous. In advance of this grading, a survey crew took soundings over the area to be revetted in order to establish a cut line far enough back from the river bank to give the desired slope for the mat.

This crew operated from a small motor boat and took soundings on circular arcs from established instrument points. By plotting this sounding data a clear picture was secured of the river bottom. Such a survey also was made on the sunken concrete mattress to insure its being properly placed.

Two draglines used

All grading of the river bank was by a dragline mounted on a barge and operating a 10-cu.yd. bottomless bucket on a 165-ft. aluminum alloy boom. The vertical river bank was cut down and wasted beneath the water to form a final surface over the entire revetment area, having a slope not steeper than 1 on 3. Usually it varied between 1 on 3 and 1 on 4.

Two grading units operated independently in order to speed the grading. The first one proceeded upstream rough-cutting the bank, followed by the second dragline which graded the river bank and subaqueous area to a final slope. Both machines operated in conjunction with mooring barges anchored shoreward by deadmen or to existing tree stumps. Roller attachments on the upstream ends of the barges on which the machines were mounted operated in rail runways on the mooring barges to guide the machines back and forth during grading operation, while at the same time remaining steady in the river current. Winches on the mooring barges operated the anchoring cables to move the entire plant upstream.

Prior to the start of grading, all interfering trees along the river bank were hand cut and removed from the area. As the normal bank-grading operations loosened a tree stump it was bulldozed away from the area with none being allowed to fall into the area to be revetted.

As the second dragline finished grading the bank to its final slope, a third boat equipped with a clamshell followed along and spread a

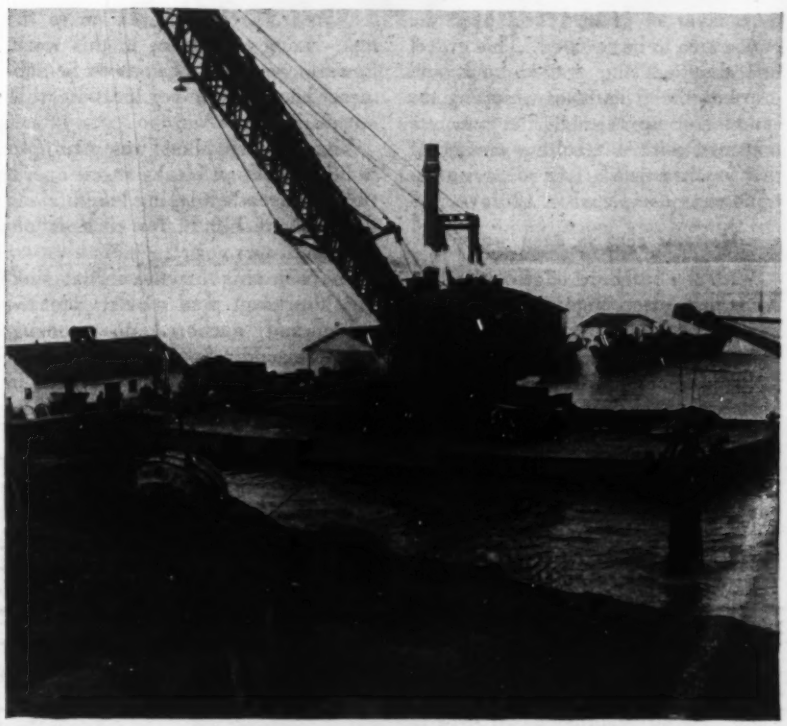


Fig. 2. Mooring barges, anchored shoreward, held the drag-line barge steady while it graded the bank to a gentle slope. At the right, gravel is being deposited on the new slope by a clam-shell bucket.

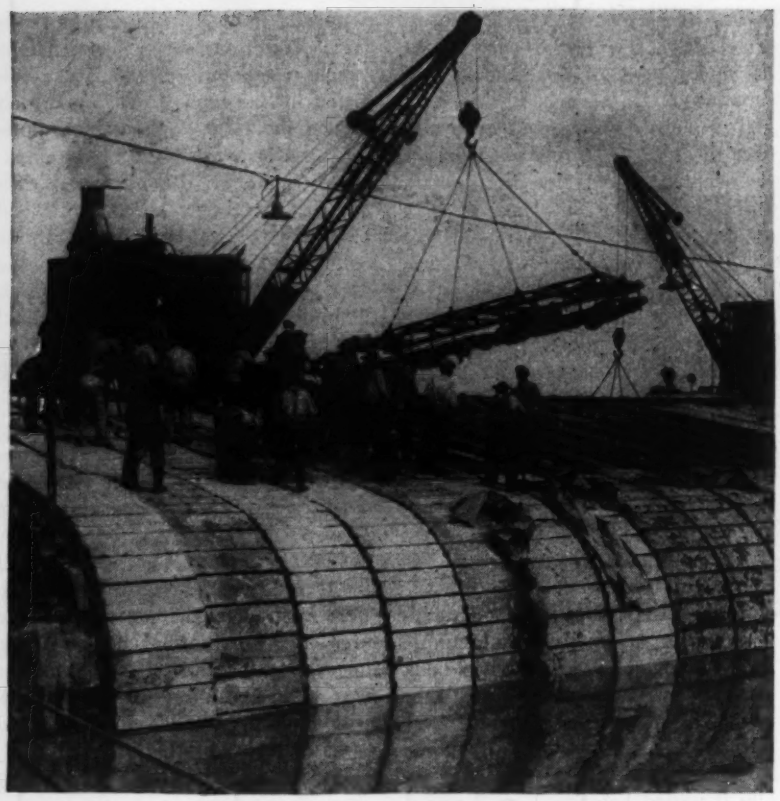


Fig. 3. Revolving cranes transferred sections of the concrete mattress from barges onto the deck of the sinking barge. Lifting-frames had 4-point pickups.

6-in. layer of river gravel over the entire area to be revetted. This gravel bed stabilizes the graded bank and prevents the river from whipping the sandy soil up through the concrete mattress, with a resulting caving of the finished work. Grading operations were completed in 12 days.

Mattress sunk in deep water

With the outboard edge of the concrete mat extending in some places 275 ft. out into the river and submerged in 80 ft. of water, the big problem of sinking was to prevent the upstream corner of each articulated section from rolling back on to the mat. Long experience in this work, however, enabled all mats to be submerged in their proper location without mishap.

The sinking plant was equipped to lay 35 rows of blocks at one operation. This made a laying length along the bank of 140 ft. for each articulated section.

In preparing for the initial sinking, the plant was moved into the shore and anchored to mooring barges extending out into the stream. These mooring barges were held in correct position and alignment by cables anchored either to deadmen buried in the bank or to existing tree stumps. In some instances the mooring (or lining) barges are anchored upstream to landing barges which, in turn, are anchored shoreward.

Typical sinking operation

After the sinking plant had been properly located adjacent to the shore it was ready to form the first mattress. Steel-beam launching arms were run out about 15 ft. over the edge of the sinking barge, nearly touching the graded bank. Revolving cranes on the stream side of the barge transferred the 100-sq. ft. sections of concrete blocks from mat barges onto the rear of the sinking barge. This continued until 35 sections had been laid side by side extending the full length of the barge.

To complete the assembly of this initial 25-ft. width of articulated mattress, each protruding wire hoop embedded in the concrete blocks was fastened with twisted wires to steel wire launching lines spaced 4 ft. apart to lie between each line of blocks. The launching lines were securely anchored to deadmen in the river bank.

Transfer of the mat sections, totaling twenty of the 14-in. by 3-in. by 4-ft. blocks, from the mat barges onto the sinking barge was by a special lifting frame using a 4-point pickup to the swinging boom. Vertical lugs on the frame extend down to form pickup supports for each block.

The deck of the sinking barge is covered with continuous lines of rollers, with roller lines spaced 4 ft. c. to c. to support the concrete blocks. Tops of rollers, and the deck, slope downward toward the shore at 1 or 12 to facilitate launching of the mats.

To start the sinking of any articulated mat, the steel launching arms

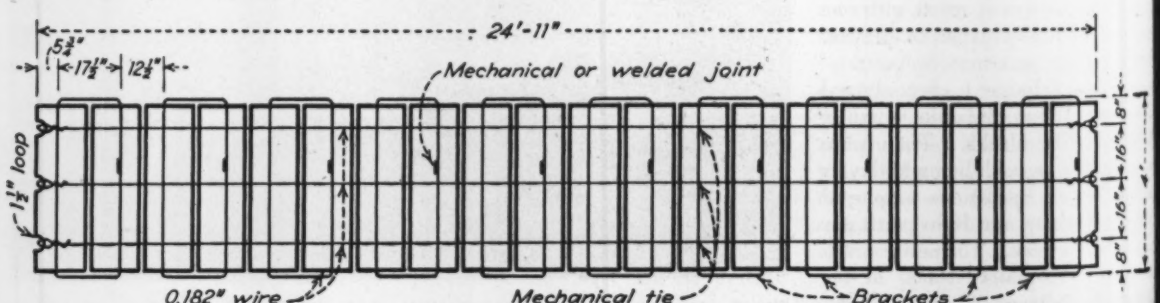


Fig. 4. Each articulated mattress section contains 20 concrete blocks. Projecting ends of wire hoops were wired to anchoring cables during installation of the mattress sections.

nding inshore were retracted, ering the concrete blocks onto the bank. To complete the opera- , the sinking barge was backed from the shore, guided by the ring barges, and the weight of mat operated to sink itself. oughout all sinking operations, a safety cable mounted at the eward edge of the sinking barge ented workmen from stepping off the river.

Work progressed upstream

aying of the articulated concrete proceeded upstream. Also, ex- ience had taught the engineers laying it at a slight angle (about deg.) downstream, instead of nor- to the bank produced the best lts. This procedure minimizes tendency of the mat to be under- or to roll up from eddy currents he swiftly moving deep water. en-foot laps were made on each iously placed mattress. Double were used at the downstream upstream ends of the revetment k, and also at the outboard edge, nsure greater permanency of in- lation. An additional row of con- e mats extends some 15 ft. up river bank from the top edge of sunken mattress. These mats e placed by a derrick boat an- ed close in to the shore which ed them off of a mat barge, hored hardby, and deposited them lace on the bank. This additional k protection overlaps the original tment work from 5 to 10 ft. king operations were started on rch 16 and finished on March 28. he entire revetment work was per- ned by the Corps of Engineers, g government-owned equipment hired labor. Cost of this bank- tection work was in the neighbor- d of $500,000.

Engineering personnel

levetment operations were under supervision of the Vicksburgh En- er District, Lt. Col. R. W. Sauer, rict engineer, reporting to Brig. . Max C. Tyler, president, Mis- ppi River Commission and divi- engineer, Lower Mississippi ey Division. George Vinzant, er Key Woods, chief of the chan- section, was directly in charge of work. The casting and sinking rations were done by plant and onnel of the Memphis Engineer

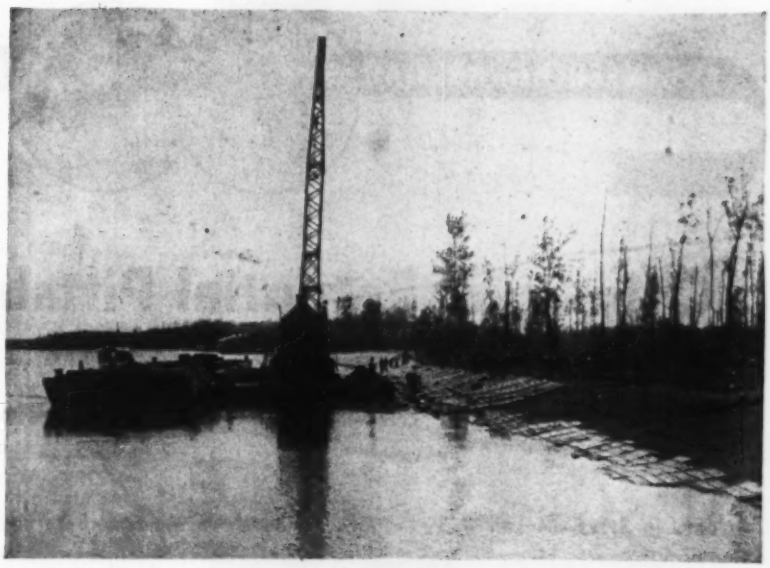


Fig. 5. Only a small portion of the sunken mattress is visible in the completed work. Additional mat sections were unloaded from barges and placed along the upper part of the bank.

District, Lt. Col. G. W. Miller, district engineer. G. A. Robinson was superintendent in charge of operations at the site. Thomas A. Goodwin Jr. was in charge of casting operations at Greenville.

Road-Building Projects in Brazil Call For Much Equipment

Brazil needs urgently a wide variety of road-building equipment and supplies to carry out her recently formulated program for highway development. This is reported by the Brazilian Commission of Inter-American Development in a current survey of that country's transportation requirements. The Brazilian National Commission is affiliated with the Inter-American Development Commission, Commerce Department Building, Washington.

Under the program the Brazilian government proposes to construct three systems of highways with a combined total length of 24,000 mi. One highway system would run from north to south, another from east to west, and the third would connect important points of two or more trunk highways. In the north-to-south system, the Getulio Vargas highway is projected between Belem, at the gateway of the Amazon, and Jaguarao, in the south, a distance of approximately 3,700 mi.

The Brazilian Commission in its survey emphasized the urgency of this highway construction. "At present," the survey pointed out, "the transportation system of Brazil does not look good, and is causing great concern.

"Highways are divided into two different systems and with no inter-connections. One system in the north is of minor importance. The second, of great capacity, is in the south. Highways generally are in poor condition, and in many parts compete with railroads, which also are in poor condition.

"Planning of the Brazilian highway system has been solved with the development of the national highway construction plan. It remains only to carry out this plan, which is in itself a tremendous task and one which can only be affected over a long period.

The commission pointed out that Brazil needs urgently: (1) Machines, tractors and equipment for opening up new roads and for improving and maintaining existing roads; (2) vehicles of all kinds, and in particular, vehicles of a simple nature and adapted to the conditions of the roads and Brazilian climate; (3) fuel and lubricants; (4) spare parts.

ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Chimbote: Potential Pittsburgh of Peru

Edward J. Cleary
Managing Editor, Engineering News-Record

Contents in Brief—A vast industrialization program in the Chimbote Bay region undertaken by several agencies of the Peruvian government, principally Corporacion Peruana del Santa, has enlisted the aid of North American consultants, contractors and engineers. Although various elements of the program are separate and distinct all of them involve the skills of the engineer directed toward the single objective of improving the economic prosperity of Peru. Projects now under way include installation of port works, housing and sanitation facilities at Chimbote, rehabilitation of a railroad, coal mining, construction of a 125,000 kw. hydroelectric plant, and the extension of irrigation works. Preparations are continuing also on a coal, iron and steel industry at Chimbote, expected to cost in the neighborhood of $12,000,000.

DON FEDERICO, who can lay claim to the dubious distinction of operating the best eating place in Chimbote, is witnessing the development of the most ambitious industrial and agricultural enterprise ever undertaken in Peru. He and his 4,000 fellow townsmen in this village at the edge of one of the finest natural harbors on the west coast of South America see many tangible evidences of things to come, but they can hardly be aware of the tremendous scope of the undertaking. Here several agencies of the Peruvian government have combined their efforts for the establishment of a coal, iron and steel industry, development of hydroelectric and irrigation works, the construction of port works and the installation of sanitation facilities.

A few months ago when this writer visited Chimbote, which possesses few of the amenities such as water supply or sewerage facilities, Don Federico had just opened a new and more expensive eating place. While it left much to be desired as far as elemental sanitation was concerned, the big adobe building with its incongruous shiny mechanical refrigerator, did accommodate more people and business was picking up. Several hundred men already were working for the Frederick Snare Corp. of New York on the construction of port works and coal handling facilities. Back from the coast in the mountain area anthracite mining operations were under way. And eighty miles distant, on the Santa River, progress was being made on a 125,000 kw. hydroelectric project that will supply cheap power in the area. In Chimbote itself, North American sanitary engineers loaned to the Peruvian government were engaged on the installation of drainage structures for malaria control, a water supply and sewerage system, and construction of a hospital.

Chimbote claims historical as well as current interest to North American engineers. When I first saw the town, circling above it in a plane at an elevation of about 1,000 feet, I noticed that it was laid out in a gridiron pattern, so typical of small cities in the United States. Later inquiry revealed the layout to have been made by Henry Meiggs, an American civil engineer who went to Peru in the 1860's, and there distinguished himself as a builder of railroads. One testimonial to his endeavors is a huge silver cup on permanent exhibit in the Pan-American Union Building in Washington, which was presented to Mr. Meiggs in 1871 on the completion of the Oroya Railroad in the Andes of Peru.

As a city planner Mr. Meiggs apparently was far ahead of some of his colleagues in the United States, judging on the basis of street layout. None of the streets in Chimbote are less than 65 ft. in width, and the principal thoroughfare provides a generous 200 ft. Chimbote had no difficulty, therefore, in accommodating itself several years ago to the Pan-American Highway with its 27 ft. width, and the town never will need to be concerned with future traffic problems.

Since the Chimbote project with its related industrialization enterprises involve a number of participants, the role of each might best be described by discussing separately the various activities now under way.

Coal, iron and stee.

Development of the coal, iron and steel industry, formerly an undertaking of the Peruvian Ministry of Development and Public Works, is now one of several projects of Corporation Peruana del Santa, an agency of the Peruvian Government. The financing of the coal, iron and steel industry anticipates aid from the U. S. Export-Import Bank in the form of a loan. Agreements negotiated in April 1942 point to the availability of credits from the bank.

In 1942 H. A. Brassert and Co. Inc., consulting engineers of New

York, reported that at Chimbote ore and coal, the two principal raw materials, can be assembled at low cost. The anthracite coal would be carried directly from the nearby Ancos-Galgada mines over an existing narrow gage railway to the plant and harbor, and the ore would arrive by water. The ore boats would tie up at a pier from which the ore would be transported by conveyor directly to a blast furnace plant. The same pier and conveyor system would serve for the exporting of anthracite coal. Estimated to cost $12,500,000 the coal, iron and steel development would be self-liquidating, and should be amortized within 7½ years after operations begin. Some 80 percent of the project cost would represent equipment and materials that must be purchased outside of Peru.

Morfitt and Co., also of New York, were later engaged by Corporation Peruana del Santa in conjunction with the Export-Import Bank of Washington to examine the properties and they are now completing an independent report on the general feasibility of the coal, iron and steel enterprise.

The proposed steel plant at Chimbote would be located about fifty miles from the coal deposits. However, suitable iron ore is not available in this area, the best deposits being located some 500 miles south of Chimbote. Since these deposits are close to the coast it is possible to use water transportation for moving the ore. Drilling operations in this area, known as the Marcona region, are reported to have shown the existence of

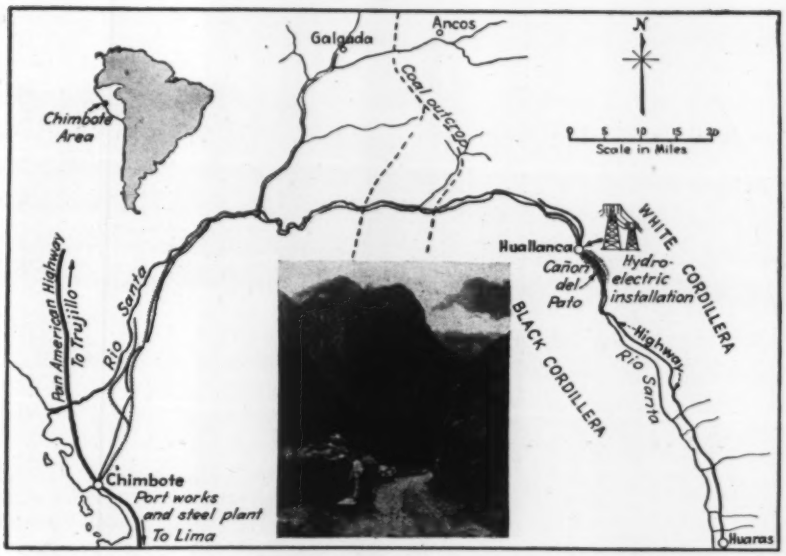


Fig. 1. Activities in the Chimbote area embrace the construction of port works and sanitation facilities at the seaport town of Chimbote, coal mining operations in the Ancos-Galgada region, and the installation of hydroelectric facilities in the Canon del Pato. The rugged terrain at the latter location is shown by the inserted photograph of the highway on the east side of the gorge.

Peru-Servicio Aerofotografico Nacional photo

Fig. 2. Chimbote hugs the seacoast on the desert plain between the Andes Mountains and the Pacific Ocean. The road at the left, which turns into the town and runs parallel to the coast, is the Pan-American highway. Irrigation has made possible the cultivation of a strip of desert shown at the right. The port works are located to the left, just beyond the range of this photo. In the background can be seen the foothills of the Black Cordillera range.

Peru-Servicio Aerofotografico Nacional photo

Fig. 3. Port works and coal-handling facilities are located at the base of the mountain which forms the northern boundary of Chimbote Bay. Pile-driving operation for a small pier can be seen offshore; a rockfill to this pier will eventually be carried out for a distance of half a mile. A new concrete road parallel to the shoreline furnishes access to the town; the proposed steel plant will be located to the right of this road.

about 10,000,000 tons of reserves. Present plans call for the open pit mining of ore.

It is proposed to smelter the ore at Chimbote, using fines from the nearby anthracite coal mining operations. Ordinarily, such fines are a total loss, but the Brassert Co. engineers report that it is possible to process these fines in combination with pitch (15 to 25 percent to produce a high quality metallurgical coke for blast furnace and foundry use. Bituminous coal, normally used in steel-making operations, is found only at long distances from the Peruvian seaboard and, therefore, is not economically available.

The Ancos-Galgada anthracite deposits in Peru are easily accessible to the coast at Chimbote, the deposits outcropping on the western slopes of the Andes at an elevation of between 4,000 and 6,500 ft. above sea level; the coal seams are from 1½ to 8 ft. in thickness. Improvement of an existing narrow gage railway to the port of Chimbote makes it possible to ship the coal on a downgrade directly to the port.

The bulk of the anthracite is to be sized and sold in domestic and foreign markets, shipments of which have already been made; annual production is anticipated to be 300,000 tons. The heretofore useless fines that result from mining, crushing and handling (estimated at 90,000 tons annually) will find ready and profitable application when steel production begins.

The possibilities of developing a cement industry at Chimbote are now under consideration with a view toward finding a profitable outlet for the blast furnace slag. Such slag, mixed with lime and alumina, will produce a high grade cement as evidenced by the product produced in this country by the U. S. Steel Corp. and others.

Plans proposed by the Brassert organization for the iron and steel manufacturing facilities include a 300-ton blast furnace; a duplex steel plant; mills for merchant bars, wire products, sheet and tin plate; and a foundry for cast iron pipe. It was not considered economically feasible at this time to undertake the production of large structural sections, heavy rails and wide strips. The more recent plans contemplate the production of fewer products, confining them possibly to reinforcing steel, rails, etc.

Alexander C. Barker, vice president of Brassert and Co. and director of the firm, in discussing the Chimbote project pointed out that:

"The iron and steel plant with much of its equipment must be specially designed, because the raw materials and manufacturing program will be different from what they are anywhere else. In the U.S.A., where at all but a few plants ore mixtures are used which are alike in general character, we have developed a standard type of blast furnace which has not changed very much in the past twenty years. The open hearths, too, are of standard design and so more or less are the various rolling mills. But all these units are too large, too heavy and too highly specialized to conform to the demands for an economical plant in Peru, working different raw materials and producing from these a variety of products, each in small quantity. In fact steel plants all over the world, to be a success, must be adapted in the choice of processes and of design and construction to their raw materials, markets, and many other local conditions."

Port handling facilities

Actively under construction at the present time are the port works and coal handling facilities for which the Frederick Snare Corporation holds the contract. This portion of the Chimbote work, which is financed entirely by the Peruvian Government, is divided into three parts, as follows:

1. Construction of a section of the

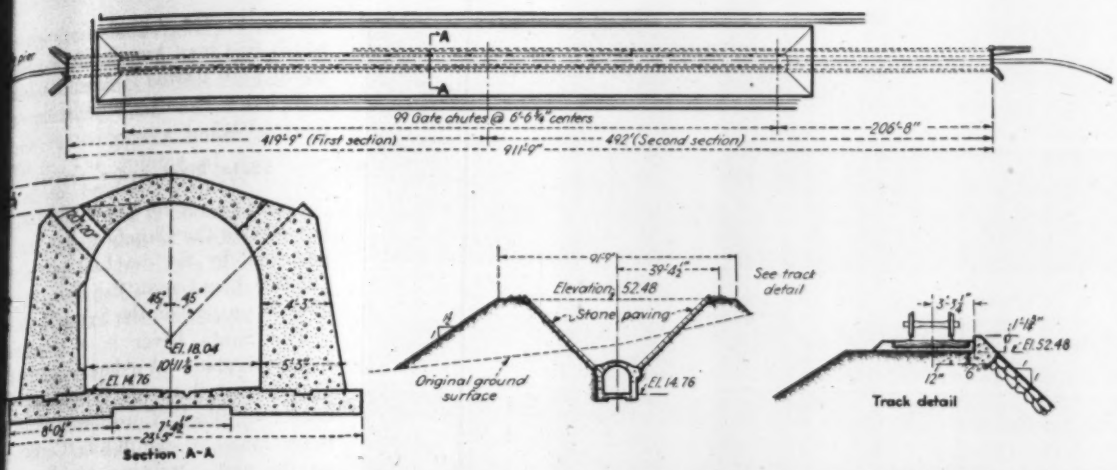


Fig. 4. Layout and details of the coal storage and handling facilities. A concrete tunnel or gallery is located at the apex of a triangular-shaped storage area formed by fills on each side of the gallery. Side-dump coal cars operated on top of the fills will be emptied into the area between the fills; coal can then be drawn from storage through the tunnel.

al handling facilities, a rockfill and all pier for the accommodation of hters, an 8-mi. railroad spur, a using development and miscellan- us small buildings. Total cost is out $1,000,000.

2. Extension of the rockfill to deep ter and construction of a pier to commodate ocean going vessels, as ll as the installation of conveying uipment to move out coal and ing back ore from ships, constitute e second and final part of the con- ct. This work is estimated to total other $800,000.

3. Installation of a municipal wa- supply system, sewers and drain- e works, as well as the construction a 56-family housing project for rkers. The total for these contract ms is over $300,000.

Coal handling procedure

Special interest attaches to the de- gn of the structure for storing and ndling the coal brought down from e mines, which has the virtues of mplicity and flexibility. It consists nothing more than a long concrete nnel gallery on either side of which ere is a sloped and paved fill. Coal rs operating on top of the fill dump eir contents into the V-shaped stor- e space between the two fills. When is desired to draw coal for ship- ent small cars are moved into the nnel gallery, which is under the se of the V, and the coal may be re- ased by gates through chute holes in e tunnel roof from any part of the ng storage pit; the deposit has a apacity of 40,000 tons (Fig. 4).

One of the obvious advantages of this arrangement, aside from its simplicity of operation, is that the lowest part of the pile is drawn upon first, thus eliminating dead storage with resultant deterioration of coal. Another advantage lies in the fact that eventual substitution of a conveyor belt for the present car hauling system can be made without disturbing much of the original construction.

Details of the structure, which was designed by W. A. H. Grantz, Lima manager of the Snare Corporation, are shown in Figs. 4 and 5.

Rockfill and pier details

The shelving beach in Chimbote harbor calls for the construction of a rockfill that eventually will extend

Fig. 5. Sides of the storage area fill are paved with rock. The paving, which is laid on the 1:1 sloped sides of the sand fill, starts at the roof of the tunnel.

Fig. 6. Rock for paving and for the harbor fill is quarried from a nearby hill.

some 2,600 ft. into the bay. At the end of the fill, which is 50 ft. in width, there will be a 600 ft. concrete pier supported on reinforced concrete piles and equipped with ore and coal handling machinery. A minimum water depth at the pier of 26 ft. will permit the accommodation of large ships. At present the rockfill has been completed for about two-thirds of its length. A dense, granite rock for the fill is obtained from a nearby hillside quarry and trucked to the dumping area.

In addition to this work, there has been constructed and is now in operation a smaller pier jutting out from the rockfill at an angle of 45 deg. and at a distance of 1,300 ft. from the shoreline. Constructed of concrete throughout, this pier is supported on 143 reinforced concrete piles, 18 by 18 in. in cross-section and 60 ft. in length.

Four gantry cranes are installed on this pier for servicing lighters and small boats that can be operated in a 16 ft. depth of water. Track is laid on the fill from the coal deposit to the end of the pier, and cars will be used for transportation until the belt conveyor system is installed.

George F. Waters, veteran superintendent of the Snare Corp., is in charge of the Chimbote work, on which 650 men are employed. Operations were started in April 1942, and completion is anticipated by the summer of 1945.

Fig. 7. Canon del Pato gorge, showing the access highway (left) with one of its many tunnels. The entrance to the diversion tunnel at the dam will be constructed at this point in the gorge.

Santa River hydro project

Cheap power for the stimulation of industry in the Chimbote Bay area is promised by the development of the 125,000 kw. Canon del Pato hydroelectric project on the Santa River.

The Santa River is a torrential, non-navigable Andes mountain stream that flows north between the coast or Black Cordillera and the main range of the White Cordillera on the east. Draining a valley that receives the run-off from 110 sq. mi. of mountains whose snow-clad peaks tower to 22,200 ft., the Santa River eventually turns west and then south to empty in the Pacific Ocean. (Fig. 1).

In one section of the river, known as the Canon del Pato, there is an abrupt fall of some 1,400 ft. in a six-mile stretch. It is this location that has been chosen for the hydroelectric project. An overflow diversion dam will be erected at the upper end of the canyon and here the water will be diverted through a pressure tunnel leading to a powerhouse at the end of the canyon. The dam, to be built of cemented granite masonry, will be 72 ft. in height and the length along the overflow crest 82 ft.

Difficult tunnel operations

The conduit tunnel, which is being driven within the east wall of the canyon is roughly parallel to the stream bed. It is to be of a modified horseshoe shape with a cross-sectional area of 280 sq. ft., and will have a length of 29,950 ft. (5.7 miles). Tunneling operations in the granite wall are being conducted from six adits, spaced to give an approximately equal division of the work. The steep and rugged nature of the canyon wall necessitated the installation of cableways across the river at each of the adits in order to gain access to them. The only highway in the area is on the west side across the canyon from the tunnel. See map, vol. page 367).

The power house will be located about a mile from the town of Hullanca, or about 75 miles northeast of Chimbote. This structure is distinguished by the fact that it will be built deeply underground to avoid

mage from rock falling from the
nyon wall. Served by five vertical
afts connecting to the tunnel, the
operating head on the Pelton
eels in the power house will be
00 ft. The volume of water re-
ired to produce 100,000 kw of
wer at this head is about 1,060 sec.
an amount that is available most
the time in the Santa River. Dis-
arge from the Pelton wheels is to be
turned to the river through a 1,575
tunnel.

Estimates made in 1941 indicate
t the cost of the initial installation
two 25,000 kw. units will be $4,-
0,000. An additional expenditure
$1,875,000 would be required for
o more units. Cost of producing
wer with the initial two units (45,-
0 kw. net), is estimated at slightly
s than 1/10 of 1 cent per kilowatt
ur on the basis of total utilization.

Construction operations began in
ly 1942 with the erection of a 1,000
. hydroelectric plant near the site
the diversion dam; this unit sup-
ies power and light for construction
rposes. Attention was also given
providing general camp facilities
cess to the tunnel adits and to the
ginning of tunnel excavation. At
e present time the project is 20 per-
nt completed, and it is expected that
e first two generators will be in
eration in 1946. (Editor's Note: *A detailed description of the hydroelectric project will be found at the end of this article.*)

Barton M. Jones, former head
anning engineer of the Tennessee
alley Authority, is acting as engi-
eer-director in charge of the project.

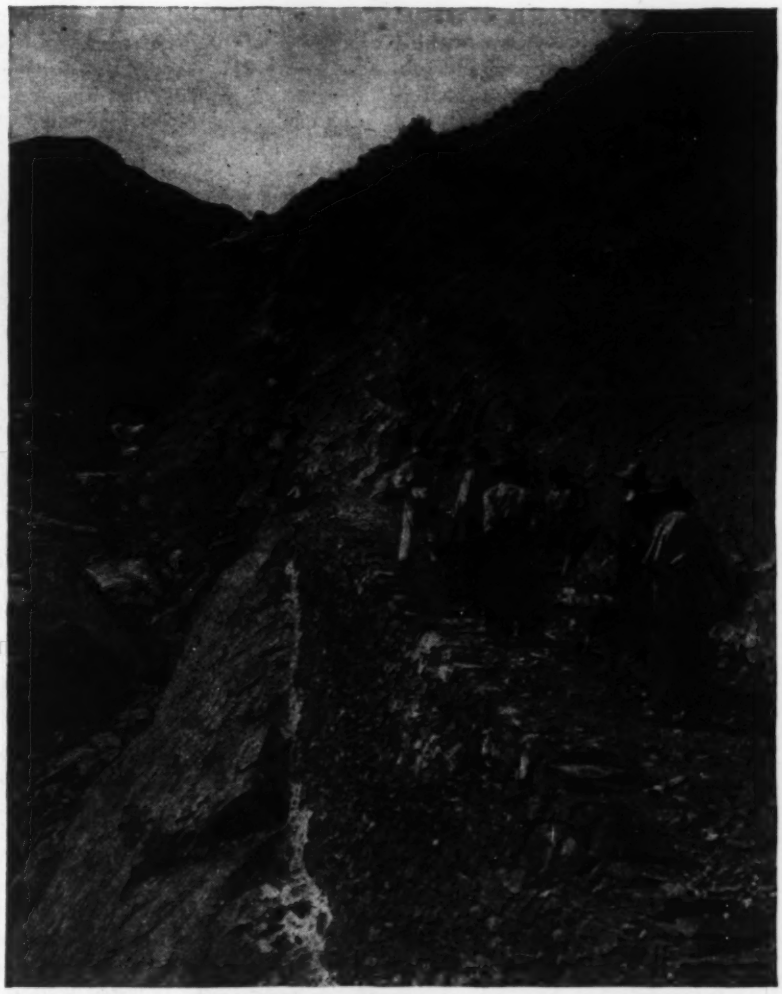


Fig. 8. Building a side-hill bench to carry a 28 in. steel penstock. This installation was made for a 1,000 hp. power plant to serve construction needs.

Santa irrigation plans

Aside from its hydroelectric power
otentialities, the Santa River is also
ommanding attention as a further
urce of irrigation water. Pouring
ore water into the Pacific than any
her stream in Peru, it traverses a
y, coastal plain in its journey from
e mountains to the ocean.

Much of the area around Chimbote
nd the coastal area north and south
the Santa River is virtually a des-
t. Yet, in the days of the Incas, this
nd was productively farmed, and
ere are still to be seen many evi-
ences of the remarkable canal and
aterway systems built by these In-
ians.

In talking with Charles W. Sutton,
North American engineer who has been working on irrigation problems in Peru for more than two decades, the writer was told that the Incas had at least 50 percent more land under cultivation than is at present used for farming in this country.

"The people of Peru," said Mr. Sutton, "do not produce adequate food. This lack of food is not an emergency problem but a chronic condition. But the general policy of irrigation, cheap power, roads and works of public utility, if properly coordinated, will make it possible for the population living in the irrigated districts that constitute so large a part of Peru to have many crops available inside their own neighborhoods."

One of Mr. Sutton's recommended projects, the irrigation of some 250,-000 acres in the Santa River area, is now expected to reach fruition as a result of the Chimbote industrialization enterprise. Plans are being activated for the installation of water diversion and storage works some miles below the Canon del Pato power plant. And in conjunction with this, it is hoped to harness the river for the production of small units of power that may be required for irrigation needs.

Sanitation at Chimbote

A principal concern of those who are laying the groundwork for development and expansion of the Chimbote area is sanitation. Lacking a water system worthy of the name, and completely without sewerage facilities, the town also had the misfortune to be adjacent to freshwater lagoons in which mosquito

breeding was prolific. It is hard to conceive that 4,000 people—eking out an existence by farming and fishing—continued to survive as well as they did. Malaria, waterborne and other energy sapping diseases are prevalent in the area.

An excellent opportunity to correct these conditions presented itself when the Office of the United States Coordinator of Inter-American Affairs made an agreement with the Peruvian Government in 1942 to aid in the establishment of certain health and sanitation projects. One of the recommended projects was the Chimbote work, and in December 1942, Maj. B. A. Whisler of the Army Sanitary Corps, who was detailed to the Coordinators Office, arrived on the scene. Later he was joined by Maj. R. K. Horton, also of the Sanitary Corps.

Backed with a half million dollar fund, $350,000 of which was supplied by the United States and the balance from the Peruvian government—these men designed and began construction of drainage work for the lagoons, a water supply and distribution system, sewerage facilities and a small hospital. A detailed story of their technical accomplishments will be told in a forthcoming article.

A word should be said about their devotion to the task in hand, which was a challenging one in many respects. The engineering problems were not easy, considering the lack of basic data and properly trained personnel to assist in making surveys and to guide the labor gangs. One of their minor problems was to discourage the natives from removing the carefully driven survey stakes—the lack of timber in this region put a special value on the wood stakes. And with all due regard for Don Federico's eating place, his standards of sanitation in food preparation required that the patrons of this establishment be fortified with a sense of resignation and some strong digestive juices. Horton and Whisler had both, but eventually a bug identified as *Endamodba histolytica* got Whisler and he recently returned to this country.

Rapid progress being made

Today, just a few months since the writer left Chimbote, great changes already may be noted. For example, in the first annual report of the Corporacion Peruana del Santa, the agency organized in June 1943 to centralize control of industrial projects in the area, it is revealed that Chimbote's port works already are in partial operation. This coupled with the rehabilitation of the railroad leading to the mines made possible the export portation of 18,000 tons of coal over a period of five months.

Recently returned travelers from Chimbote tell of the rapid construction of workers' housing facilities and of the municipal water supply and drainage structures now in operation. And progress on the hydroelectric project is indicated in the article that follows.

Unusual Design Features Distinguish Hydroelectric Project in Peru

***Contents in Brief**—Details of the hydroelectric project briefly described in the preceding article on Peru's industrialization of the Chimbote Bay region reveal departures from conventional practice. Among these are the subterranean location of the power house, a dam with its vertical face on the downstream side, and the use of an unlined pressure tunnel.*

SEVERAL FEATURES distinguish the Canon del Pato hydroelectric project in Peru where construction operations have been underway for two years. Here, in a six-mile stretch of the Rio Santa, advantage is being taken of the fall of 1,400 ft. in the river bed to provide for the ultimate development of 100,000 kw. of continuous energy at a cost of 0.7 of a mill per kilowatt hour on the basis of total utilization. Natural conditions have imposed some departures from conventional practice, but most of these have been developed into advantages.

For example, the solid masonry overflow diversion dam must be built with its vertical face on the downstream side of the structure. Again, because of the necessity of using a subterranean site for the powerhouse, it has been possible to locate this facility far underground. And finally the 5.7 mile continuous conduit tunnel and the five vertical penstock shafts may be operated under pressure without a concrete or steel lining, due to their deep location in solid granite of superior physical structure. As a precaution and as a test of the structure, cement grouting at not less than 1,000 lb. pressure will precede the excavation of tunnel and shafts.

Surveys and examinations made in the Canon del Pato since 1941 have verified the fact that this is an outstanding site for the development in a single installation of 125,000 kw. of extremely low-cost power, within a transmission distance of less than 80 miles from the best natural harbor on the western coast of South America. Continuous operation at 100,000 kw. will require about 1,066 sec. ft. of water, an amount that will be available most of the time from the flow originating from the glaciers and areas of perpetual snow on the watersheds extending along 110 miles of the east side of the canyon. No daily regulating reservoir is contemplated since the maintenance of such a structure would not be feasible. Neither is it proposed to include seasonal storage for the regulation of the flow. However, advantageous reservoir sites do exist at the headwaters of Rio Santa that may be developed when warranted for the combined purposes of irrigation and power.

Details of the dam

As shown in the accompanying photos, the dam site is narrow and deep, with steep walls. Since no water storage is being provided, the diversion dam needed to be only 72 ft. high, and the crest (at elevation 5,930 ft. above sea level) will be only 82 ft. long.

The dam is so designed that all its ures will satisfactorily withstand cts from the overflowing water n with the heavy sand and stone ris flowing in the Rio Santa, es- ially during floods and the high er season. Large granite blocks d in cement mortar will be used at surfaces where the dam will be osed to erosion, and the interior l be cyclopian masonry of concrete d granite.

An unusual feature of the design to vent erosion is the provision for vertical face of the dam to be on downstream instead of upstream e, in order that the stones carried r the crest will fall clear of the face d directly upon a cushion of stone the canyon bottom. The arrange- nt assures an automatic and con- uous replacement of the stones rming the cushion. No provision ll be made to remove the accumu- ion of debris upstream from the m. It is contemplated that the small in will become completely and rmanently filled with stones and vel within a few weeks after com- tion of the dam.

Upon the fixed masonry crest of dam will be installed an A-frame e of adjustable steel crest for con- lling the surface elevation of the ter opposite the intake. The frames, out six feet in height, may be sed or lowered one at a time from overhead cableway. The A-frames ll be built in units with bases of nvenient size, any one of which may removed when damaged or eroded, d replaced by a completely new sembled spare unit.

During construction of the dam, ich will be done during one sea- n of low run-off, the water of the er will be diverted through a by- ss tunnel about 750 ft. in length, cavated below the river bed in the st wall of the canyon. (Fig. 4). In preparing the foundation for the m, the river channel will be ex- vated to the solid rock bottom. Ex- vation into the sides or bottom of site for bond or anchorage of dam does not appear to be neces- y and probably the operation will avoided. The sides of the canyon erhead will be stripped, so far as acticable, of stones or other ma- ial that might, by falling, endanger structure or its operation.

The intake structure will be located on the east or right-hand side of the canyon, adjacent to the dam. The sill of the intake will be higher than the fixed crest of the dam for the purpose of gathering the clearer surface water while allowing the lower layers of the water laden with rock, gravel and sand to pass by the intake and over the dam.

Fig. 1. Canon del Pato looking downstream opposite the site of the underground powerhouse.

However, it would be nearly impossible to prevent small stones, gravel and sand from entering the intake and tunnel with the water. Therefore, heavy horizontal rack bars will be installed to deflect the boulders from the entrance. Small rock, gravel, and coarse sand will be removed from the water by wasteways in the tunnel near the intake. A sand trap of suitable size and design will be located underground in the tunnel a short distance downstream from the intake, and another will be placed at the lower end near the top of the penstock shafts. (Fig. 4.)

The massive solid granite forming the right-hand or east side of the Canon del Pato is of such physical structure that it permits the location and construction of a tunnel suitable to operate under any desired pressure. The advantages of operating under pressure are that it will simplify control of the completed system, and the loss of head at any time will be no more than that caused by the amount of water being used according to the load being carried.

A larger unlined tunnel will cost much less, of course, than a smaller lined one of the needed flow capacity. Furthermore, it is doubtful if a concrete lining in the tunnels would serve to prevent transmission of the internal water pressure to the small seams in the granite formation. For these reasons concrete lining will be used only at isolated places where loose formation may be encountered.

A feature of the design that will further assure against the need for concrete lining is the employment of high-pressure grouting in advance of the tunnel excavation; this will stabilize the formation and close any seams that may exist in the formation. A test for leakage will first be made by

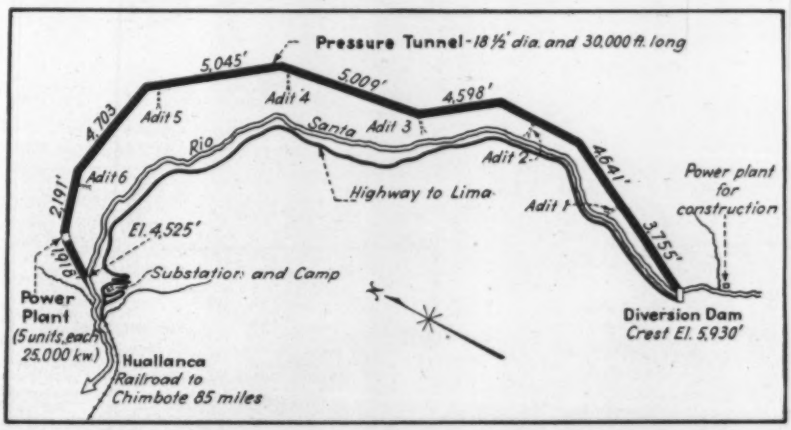


Fig. 2. Principal features of the Canon del Pato hydroelectric project are an overflow diversion dam, a 5.7-mile tunnel and an underground powerhouse. In this canyon section of the Rio Santa there is an abrupt fall of some 1,400 ft., which fact led to its selection for power development. Because of the precipitous canyon walls access to the tunnel operations can be gained only by cableways across the gorge to an existing highway on the west bank.

Fig. 3. Removing loose rock from the sides of the canyon at the site of the dam. Since this structure is not intended to provide storage but will serve simply for diversion of river flow, it will be only 72 ft. high, the width of the dam is 82 ft. A flow of some 1,100 sec. ft. draining from areas of perpetual snow will be available most of the time.

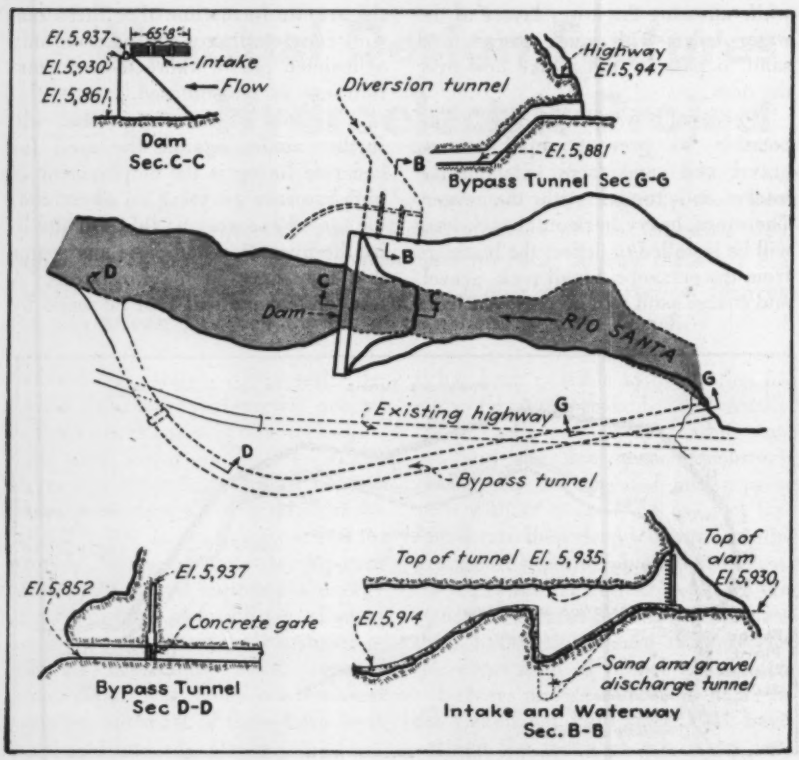


Fig. 4. Plan and sections of the dam, intake structure and the bypass tunnel in the narrow gorge of the Canon del Pato. Note that the vertical face of the dam is on the downstream side of the structure. Design of the wasteway for removing sand and gravel is shown in Section B-B. When the dam is completed the bypass tunnel will be sealed with a concrete gate, as shown in Section D-D. A detail of the bypass tunnel entry is shown in Section G-G.

applying water under pressure to t
or three holes drilled as deep as fe
ible in advance of each headi
Should the holes indicate leakage, th
will immediately be grouted with ne
cement grout to refusal at a pressu
of not less than 1,000 lb. per sq.
If found more suitable, a quick-setti
cement may be used for this groutin
With this procedure, the drilling an
blasting will be in formation that
known in advance to be both stab
and watertight.

The tunnel alignment has be
located at such a depth within th
mountain that at no point will th
water find relief at the surface of th
rock within a distance of at lea
double the head on the tunnel und
static conditions. This provides libe
ally for the seams in the formation
resist the internal water pressu
transmitted to them, and the distan
is sufficient to develop frictional re
sistance and retard leakage of wate

The cross-section and gradient
the tunnel has been designed fo
150,000 kw. with a liberal margin
safety regarding the coefficient of fri
tion. A "horseshoe" section that i
almost circular has been adopted; th
diameter is 18.37 ft.

Method of construction

The general location of the tunn
is shown in Fig. 2. From each of si
adits excavation will proceed at tw
faces, one progressing upstream an
the other downstream. Locations o
the tunnel and adits have been so ad
justed to the topography that the wor
to be done and the time required b
all of the twelve headings will b
approximately equal. By alternatin
the use of equipment between the tw
headings, one set of drilling and muck
ing equipment will suffice for eac
pair of headings reached from eac
adit.

A tunnel profile has been adopte
that will provide a downgrade fro
each heading to the entrance of eac
adit just sufficient to move the loaded
roller-bearing, muck cars by gravity
This procedure was considered to b
the most feasible method for handlin
the muck under the prevailing condi
tions. Furthermore, the profile pro
vides natural drainage and the conse
quent avoidance of pumps and piping
that might otherwise be needed.

At all of the adits the floor of the
tunnel is at the same elevation, 5,805.6
feet. The accumulation of entrapped

from the water will be drained
each apex in the tunnel through
nanently installed piping.

Underground powerhouse

he site of the powerhouse is 1
upstream from the town of Hual-
a, or 87 miles by rail from Chim-
. The absence of a site suitably
for the powerhouse and which
ld not be exposed to destructive
ng rocks compelled the adoption
n underground location excavated
olid rock.

he site is in the mountain, 1,375
rom the river at its nearest point.
floor elevation will be such that
equipment that would be damaged
made inoperative by floodwater
be placed above El. 4,575. This
he level that would be reached
er full-load operation during a
water equal to the record Huaraz
d of December 1941.

he underground chamber, approx-
tely 50 ft. wide and 250 ft. long,
be made proof against infiltra-
of water by high pressure grout-
and special drainage. Such parts
he walls and roof that require
ilization will be lined with con-
e and steel.

reliminary specifications for the
erating units have for some time
in the hands of manufacturers.
said that these were made as free
ossible from limitations in order
the manufacturers could collab-
e in determining the type and de-
most advantageous to their shops
current conditions as well as to
project. Units each having a ca-
ity of 25,000 to 27,000 kw. of the
izontal shaft, double overhung im-
e type with two nozzles per run-
at a speed of 450 rpm. appear
be most advantageous. The pos-
e alternative having some advant-
s would be vertical units of the
e capacity and speed having four
zles operating on one runner. The
tical machines would, of course,
ess rugged, and with all the wear
a single runner the repairs to it
ld be more frequent; with the
er of Rio Santa this would be a
ous disadvantage.

he electrical characteristics are to
3-phase, 60 cycle current gener-
d at 13,800 v. with transmission at
less than 110,000 v. These cor-
pond to the existing systems of
a and of Cerra de Pasco.

Fig. 5. Cableway cars of this type are used to transport men across the gorge from the access highway. Virtually all the equipment and materials for the tunnelling operations must be handled by means of cableways.

Fig. 6. One of the first jobs on the project was to build a steel penstock from a small stream to a point near the site of the dam where a temporary power plant could be installed.

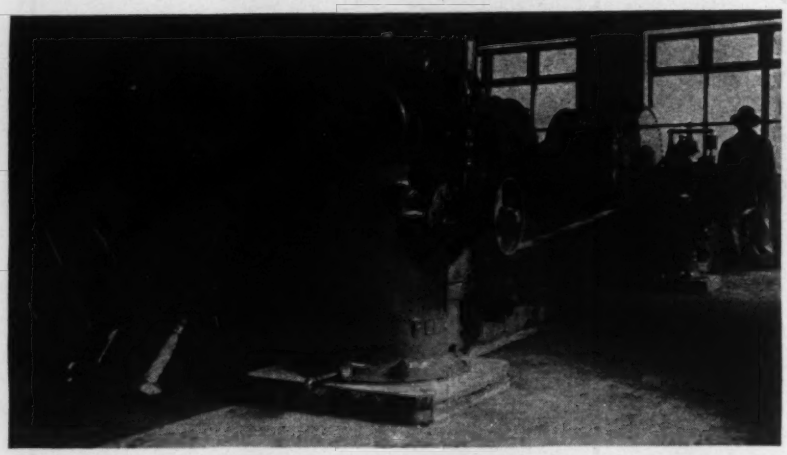


Fig. 7. Two waterwheel generator units, each of 500 hp., were installed to provide power required for construction operations.

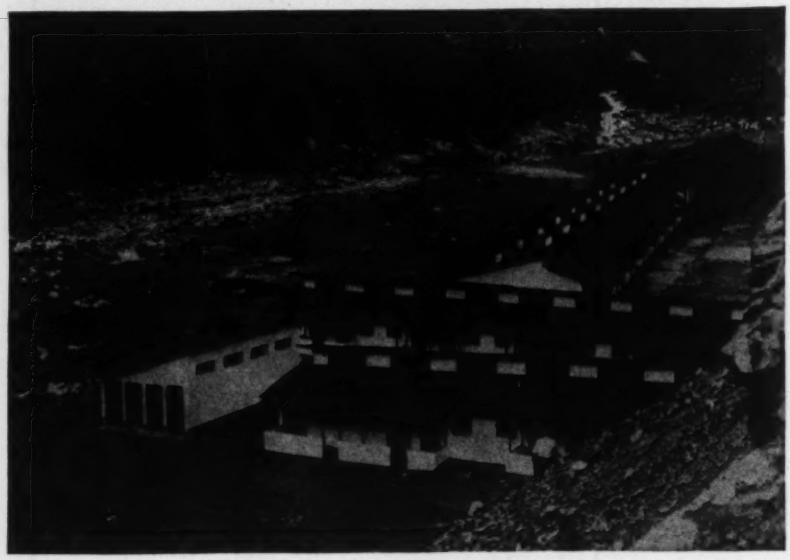


Fig. 9. One of the camps provided for construction workers and their families, consisting of three units of connected houses built with adobe.

Shafts of 6 ft. diameter will be drilled vertically in the solid granite to serve as the penstock for each of the five units. It is probable that a complete lining of steel pipe may not be required, but this question must be determined during the period of drilling, testing, and grouting. The total drilled depth of each shaft will be 1,435 ft. from top to bottom (between El. 6,002.4 and El. 4,567.4). These shafts will be drilled with the type of "calyx" drill that descends down the hole as the work progresses. Water passages will be made from each shaft to the top of a transverse manifold or header tunnel at the downstream end of the pressure tunnel located almost vertically above the powerhouse.

The tailrace tunnel will be 1,574 ft. long with an unlined cross-sectional area of 221 sq. ft. The floor of this tunnel at the river portal will be at El. 4,546, about 10 ft. above the normal river surface.

Another tunnel at a higher level will accommodate a railway track for the delivery of machinery to the powerhouse. This track will be served from a one-mile extension from the present railroad terminus at Huallanca which will be built on a graded surface constructed several years ago. The tunnel will also provide permanent access to the powerhouse, ventilation, and space for control cab and the outgoing power cables 13,800 v., as well as for pipes servi various purposes.

The strategic value in having lar sources of industrial power pro against bombing attacks from the has not been overlooked. With t powerhouse, penstocks and all of t water conduit far under the surfac the important elements of the R Santa project will be free from bom ing hazards.

The transformers will be install on a masonry bridge adjacent to t access tunnel, and the nearby switc yard will be reached by single hig tension spans from each bank of tra formers. The transmission lines w depend upon the size and location the various loads and they have n been definitely established other th that the principal delivery will be Chimbote at a distance of 75 mile

Project direction

The Canon del Pato hydroelectri project is sponsored by the Corpor tion Peruana del Santa, a Peruvia governmental agency operated by board of five directors, of who David Dasso serves as chairman an as manager. Mr. Dasso, who holds a engineering degree from the Mass chusetts Institute of Technology, w one time a vice-president of Amer can Locomotive Works in the Unite States. Prior to his connection wi the Corporacion he was Minister Finance of Peru.

From its commencement in Jun 1942, Barton M. Jones, as enginee director, has been in charge of th project, which is designated official as Central Hidroelectrica del Cano del Pato section of Corporation Pe uana del Santa. For the previous nin years Mr. Jones was associated wit the Tennessee Valley Authority, ser ing successively in charge of Norr Dam including much of its desig then for more than two years chief design engineer on all the pro ects and holding the position of hea planning engineer at the time of hi resignation to go with the Peruvia government. He recently visited th United States to make arrangement for the delivery of tunnelling an other equipment.

Construction work on the project the present time is reported to b about 20 per cent complete.

Culvert Designed to Smooth Stream Flow

I. Greenfield
Louisville, Ky.

TUDY OF STREAM FLOW on a moun-in stream in New York led to an usual design of culvert. Low avail-le headroom and a crooked channel re part of the field difficulties to rcome.

The stream flows through a narrow lley about three times as long as its idth. The ground is wooded and the pes are mountainous. Increase in pulation in the area indicates that me of the woods will disappear and consequence the stream flow will crease during rains of high inten-y.

No records of stream flow existed, the size of the structure required s established from local data, rgely the capacity of an old culvert der a railroad embankment nearby. idence showed that the existing cul-rt probably had never been more an two-thirds full. The new water-y was designed about 25 percent rger to allow for the infrequent ods from very high intensity rain-ll now believed to occur at some me on almost every watershed.

The existing channel made some arp turns immediately upstream om the road, then was forced rough an inadequate culvert, set at ght angles to the road. This struc-re frequently flooded, due partly to e necessity for twisting flow through e culvert, built to fit the road rather an the stream.

To fit the most direct flow of the ream, the new culvert was designed r a skew of 54 deg. with the road-y. The invert grade was established taking elevations on the existing ream for a considerable distance th upstream and downstream from e location and setting the culvert on is grade.

The culvert is composed of three 6- dia. reinforced concrete pipes aced parallel with the axis of the ream and with the center pipe of the lvert set 12 in. lower than the pipes either side.

The approach invert has the same general contour as the downstream invert but its upper edge is raised 4 in. above the hydraulic gradient of the stream. This creates a submerged weir and prevents erosion of the banks at the culvert invert by slowing the velocity of approach slightly. Also, the contour of the approach slab and the difference in grade of the pipe channels the stream flow to its center and prevents high velocity flow at the edge of the channel.

Water funneled to center

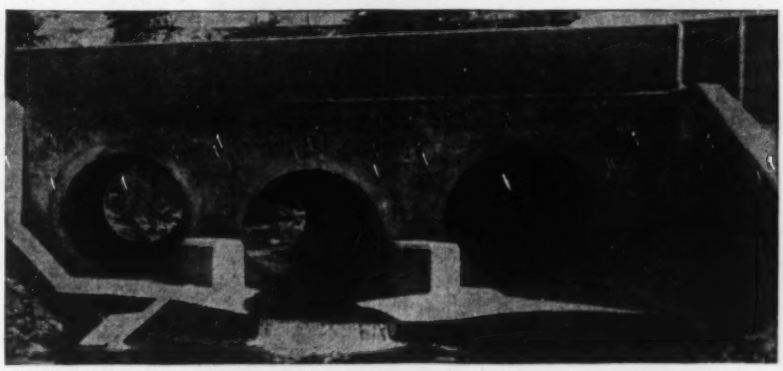
Under actual flow conditions, with the center pipe one-half full (the maximum stage observed to date), the water has a component toward the center of the channel of about 15 deg. starting from a point about 25 ft. upstream from the approach invert. Downstream there is practically no longitudinal flow along the stream banks for a distance of 5 ft. below the downstream invert. Thus, the water is funneled toward the center, increasing in velocity from the edge until at about 25 ft. downstream it again reaches its normal flow.

The width of the culvert is several feet greater than the channel. By making the wingwalls parallel to the stream rather than at an angle, considerable excavation was avoided. Also, if it is necessary to widen the roadway, the wingwalls and the entire structure can be extended at less cost.

The wingwalls are of the gravity type with no reinforcing except dowels at the construction joints, located at the level of the invert. The dowels are long enough to develop bond and resist the overturning moment of the backfill as the walls are not sufficiently heavy above the footing level to resist the thrust from the earth.

The side of the invert adjacent to the wingwalls is sloped to allow the backfill to spill around the end of the wing and produce a natural sloping earth cross section. The value of this slope can be seen in the picture. It will be noted that the sloping invert prevents the backfill from spilling around the edge of the wingwall and over the bottom slab.

The small pier between the culvert openings was designed to guide the water into the individual pipes. Lack of qualified concrete workmen prevented forming the pier to exactly conform to the pipe openings but even as built they act as training walls.



Making the center opening of a three-pipe culvert low keeps the water in the center of the channel, at both low and high streamflow. Wingwalls parallel the stream to save excavation. Note that the sloping invert prevents spill from the toe of the backfill coming on the concrete.

Simple Formulas for Pipe Bends

Peter J. Mascaro
Pittsburgh, Pa.

TIME REQUIRED for the calculation of pipe bends is materially reduced by the use of two formulas recently developed by the writer for his own practice. As engineer of the Power Piping Division of the Blaw-Knox Co., it was felt that an inordinate amount of drafting-room time was required for figuring pipe bends when using the formulas given in the standard piping catalogs.

Simplification was undertaken and two formulas were developed for the general case of an offset bend. These formulas also can be used for angle bends, offset bends with unequal radii, and other forms of bends in one plane. They give a more exact value of the bending angle because only one approximation is involved; both have proved their usefulness in the drafting room of the Blaw-Knox Co. at Pittsburgh.

Statement of formula

Case I—Offset bend with equal radii and the values of R, X and y given (Fig. 1). If y is not given its value can be assumed, but whether given or assumed the value must be greater than or equal to $\sqrt{4RX - X}$ The two formulas are:

(*a*) $$L = \sqrt{y^2 + X^2 \times 4RX}$$

(*b*) $$\tan\frac{\alpha}{2} = \frac{X}{y + L}$$

These formulas are general and can be used in any case, whether $R > X$, $R = X$, or $R < X$.

Case II—Offset bend with equal radii and $L = O$ (Fig. 1). In this particular case the formulas become:

$$\tan\frac{\alpha}{2} = \frac{X}{y} \text{ and } y = \sqrt{4RX - X^2}.$$

Case III—Angle bend with the values of R, x and y given (Fig. 2). The angle bend can be considered as half of an offset bend and the values of L and $\frac{\alpha}{2}$ can be obtained from formulas *a* and *b* (Case I), which in this special case change as follows:

$$L = \sqrt{y^2 + X^2 - 2RX}$$

$$\tan\frac{\alpha}{2} = \frac{X}{y + L}$$

where X, y and L are the values for the angle bends as shown by Fig. 2.

Case IV—Offset bend with unequal radii and the values of R_1, R_2, X and y, given (Fig. 3). Formulas *a* and *b* (Case I) can be used putting in place of R the mean value of the two radii $\frac{R_1 + R_2}{2}$ The formulas change as follows:

$$L = \sqrt{y^2 + X^2 - 4X \times \frac{R_1 + R_2}{2}}$$

$$\tan\frac{\alpha}{2} = \frac{X}{y + L}$$

As given above the formulas are in the forms used in the Blaw-Knox

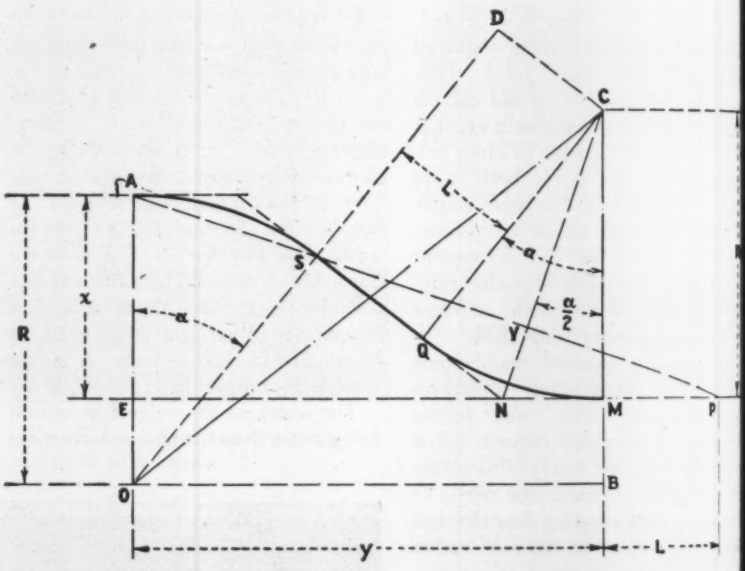


Fig. 4. Derivation of pipe bend formulas used in Blaw-Knox drafting room is based upon the simple diagram above.

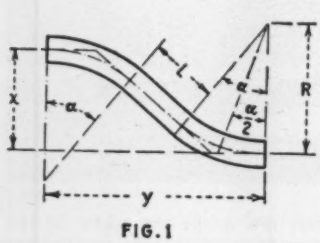


FIG. 1

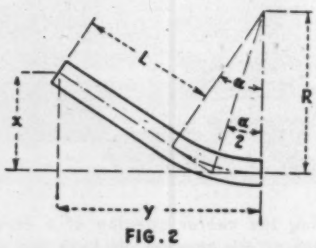


FIG. 2

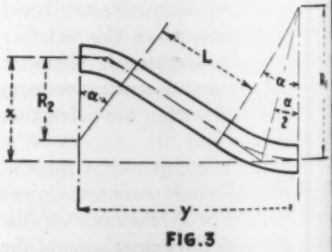


FIG. 3

Diagrams for simple pipe bend formulas. Fig. 1 shows dimensions to be used for formulas for an offset bend of equal radii. Fig. 2 those for an angle bend, and Fig. 3 dimensions to be employed for formulas for an offset bend with unequal radii.

ting room. Their derivation, (re- ing to Fig. 4) is as follows: Let be an offset bend of equal radii X the offset; y the distance be- n the tangent points A and M; L straight part of the bend, and α angle of the bend. It is desired to the relations between these quan- s and in particular to find L and α re the other quantities are given. rom Fig. 4, $BC = CM + MB$. $CM = R$, $MB = EO = R - X$, $BC = R + R - X = 2R - X$. he right triangle OBC the hypo- tenuse $OC^2 = OB^2 + BC^2 = y^2 + (2R - X)^2$ (1). In the right triangle ODC, OD = 2 R and $OC^2 = (2R)^2 + DC^2 = 4R^2 + L^2$ (2). Substituting this value in (1)

$4R^2 + L^2 = y^2 + (2R - X)^2$ or $4R^2 + L^2 = y^2 + 4R^2 + X^2 - 4RX$ or $L^2 = y^2 + X^2 - 4RX$ or $L = \sqrt{y^2 + X^2 - 4RX}$

Draw the chord AS and continue it until it meets the line EM in P. The two right triangles NVP and NVS are equal having one side NV in common and the two adjacent angles equal. Then $NP = NS$ and deducting the two equal parts NM and NQ, the part $MP = SQ = L$.

In the right triangle AEP, the angle APE is equal to angle NCM because the two sides of the former are perpendicular to the two sides of the latter. But the angle NCM $\frac{\alpha}{2}$ then angle $APE = \frac{\alpha}{2}$ and

$$\tan \frac{\alpha}{2} = \frac{AE}{EP} = \frac{X}{EM + MP} = \frac{X}{y + L}$$

The above relation gives the angle $\frac{\alpha}{2}$ and multiplying by 2 the angle α is obtained.

Vertical Vibration Studies On Golden Gate Bridge

n instrument has been developed tried out on the Golden Gate ge at San Francisco for making cord of vertical vibrations in that cture caused by winds. Eight of instruments, called vibration rders, are to be built, synchron- and used simultaneously on dif- nt parts of the structure in order ake the vertical vibration record omplete as possible. However, a e machine was first built and ex- ments have been made with it ake sure the design is suitable he desired results.

he first machine, in a series of ratory tests, satisfactorily re- ed on a rotating drum the ver- movements of a test platform ing in vertical amplitude from 90 in. and in periodicity from than 3 to more than 9 sec. Prior he laboratory tests the instru- was placed at the center of the en Gate Bridge and there con- ed the expectation that it would satisfactorily on the 4,200-ft. ension span. The final labora- test indicated that with this in- ment it would be possible to sure the vertical movement of bridge deck with an average of less than 1 percent.

nding construction of the seven icate instruments, this first vi- on recorder, which in many re- ts is similar to instruments for rding seismic disturbances, has loaned to the San Francisco- and Bay Bridge for studies on structure. When all seven in- ments are ready for operation it is planned to put one at the center of the Golden Gate Bridge span, one at two quarter points, one in each of the two approach spans and two on opposite sides of the main span where they will record any departure from synchronous motion in the two main cables.

The program of carrying out these vertical vibration studies is a joint project of the Public Roads Administration and the Golden Gate Bridge & Highway District. It is under the general supervision of the Committee on Field Observation (Raymond Archibald, chairman) Advisory Board on Investigation of Suspension Bridges, of which E. F. Kelley, Public Roads Administration, Federal Works Agency, is chairman. George S. Vincent, bridge engineer of the Public Roads Administration, represented that organization in the calibration tests on the first instrument which was designed under the supervision of L. H. Nishkian, engineer, Golden Gate Bridge & Highway District. Dr. Perry Byerly, University of California, advised as to the type of instrument to be built and is cooperating with the committee.

In addition to these studies of vertical vibration, some tests have been made and more are planned in measuring the vertical components of winds that strike the bridge. The results of such tests are to be coordinated with the vertical vibration studies in the hope of thereby making possible a more comprehensive analysis of wind effects.

The effect of vertical wind components on suspension spans came into focus sharply during investiga- tion of the Tacoma Narrows Bridge collapse. Since then the subject has been studied to some extent in the large wind tunnel built expressly for bridge model tests at the University of Washington in Seattle. The vertical angle measurements on the Golden Gate Bridge came about largely as the result of work with the large Seattle tunnel and have been made by Prof. F. B. Farquharson, who has charge of the Seattle wind tunnel. This series of studies is not to be limited to the Golden Gate Bridge.

Revised Recommendation For Clay Tiles for Walls

A revision of simplified practice recommendation R61-30 for clay tiles for floors and walls, has been approved for promulgation, according to an announcement by the Division of Simplified Practice, National Bureau of Standards. It became effective Sept. 1, 1944 and will be identified as R61-44.

The recommendation is now broadened to include wall tile trimmers, flat quarry tile, quarry tile trimmers and quarry tile colors, in addition to glazed wall tile and ceramic mosaic. The glazed wall tile sizes remain the same as in the superseded issue, but in the ceramic mosaic there are a number of additional sizes and shapes listed. Considerable reduction in the number of stock sizes and shapes commonly manufactured will be noted.

Until printed copies are available, a limited number of mimeographed copies of the recommendation may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington 25, D. C.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTOR

Galvanized Bridge Rail Tried in Minnesota

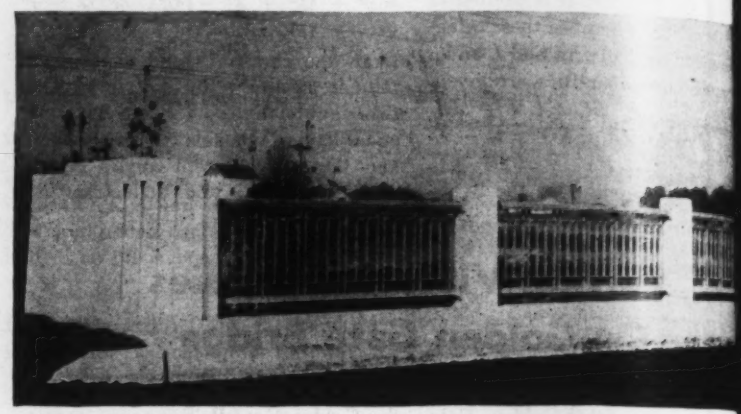
The State of Minnesota Department of Highways has had more or less difficulty over a long period of time with proper protection and maintenance of steel railings on bridges in Minnesota. The difficulty has been especially apparent in the use of steel pipe railing, which in a very short time develops weaknesses in the paint film in the nature of pock marks or blisters. This failure of the protective coating by blistering is attributed to insufficient care taken in the preparation of the railing for painting. The original oil or varnish film placed on the pipe for a protective coating during warehousing is very difficult to remove completely, except by sandblasting or pickling.

In order to eliminate the difficulties in maintenance painting on bridge railings, the bridge department decided to experiment with hot dip galvanizing. After consultation with local firms regarding the possibilities, it was found permissible to specify hot dip galvanizing on bridge railing sections having a length of 9 ft. and a height of 3 ft. 2 in. The department, therefore, specified on the plans for one project "Rail to be hot dipped galvanized as per M.H.D. 3,394 after fabrication, rail sockets included."

The railing treated in this manner, consisting of 28 panels having a total length of 250 lin. ft., is illustrated in the accompanying photograph. It is used on a bridge located on the Lilac Highway immediately west of Minneapolis. The structure was constructed by the Ernest Ganley Co., Inc., Minneapolis, in 1941.

The department at first intended to allow this particular railing to weather one year before applying a final field coat of paint. It has since been decided that the natural galvanizing has weathered to a point rather pleasing with relation to adjacent concrete surfaces, and maintenance painting has been eliminated.

The department plans to continue this method of protective coating for a portion of Minnesota steel bridge railings when construction can again be resumed.—E. J. MILLER, *Bridge Engineer, State of Minnesota Department of Highways, St. Paul, Minn.*

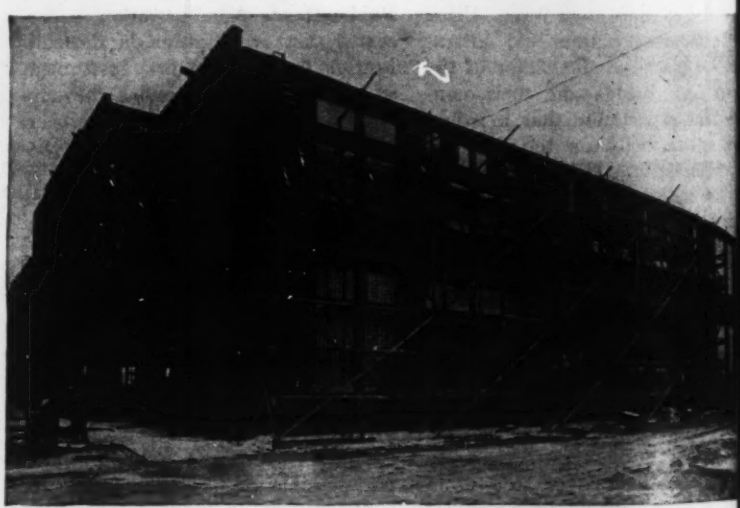


Appearance after one year of weathering of hot-dipped zinc galvanized hand railing used on a Minnesota bridge.

Glass Block Replaces Sash in Engine House

Faced with frequent breakage of glass panes, the difficulty of keeping them clean and the necessity for periodic painting of the steel sash, the Baltimore and Ohio Railroad Co. has recently closed all of the window openings in its Cumberland, Md., locomotive repair shop with glass block.

After removing the old sash, concrete sills were poured in place on top of existing sills to provide a level surface for the block. Instead of cutting back into the old masonry walls to form chases, wood chases were erected. Window openings were adapted to the size of the block by varying the thickness of the wood members, which were anchored to the masonry walls with expansion



Installing glass block in old window openings of B&O locomotive shop.

Because of the size of some e openings, wood mullions were to give support to the panel. ll wood sash were set into most of upper and lower panels for lation.

cording to C. B. Harveson, engi- maintenance of way, "More com- ble working conditions, better ing and cleanliness, plus the fact workmen are not distracted by is going on outside the building, increased efficiency as much as ercent."

e construction work was carried by the Steiner Construction Co. altimore.

---

lt Tightening for Timber Structures

Within 3 to 4 months after a timber cture is erected, it should be gone completely and bolts throughout tened. At successively lengthening rvals or until the lumber has hed moisture stability, which will due to moisture and heat, inspec- and tightening should be re- ed (See also "Are Timber Checks Split Serious?" *ENR*, July 27, , vol. p. 110, reprints of which be obtained from National Lum- Mfg. Assn.)

very bolt should be tested with a nch to determine individually that tight. A regular spud wrench sufficient length to tighten bolts erly with a normally strong pull. pipe is used to lengthen the han- care must be exercised not to strip bolt threads.

raw all timbers into full contact at y joint. Where this is difficult, due warping or shrinking of lumber, aged or rusty bolts or rings out alignment, proceed slowly. Make that the ring is properly placed in routing to avoid damaging tim- A little oil on threads, in advance olt tightening, works wonders.

ll the nuts at a single joint should ghtened a small amount in rota- and the operation repeated as as necessary to close the joint. If does not close readily part of the should be taken up and the joint ed to "rest" for some hours or night.

may be helpful to reverse one or of the bolts at a joint, thus per- ing tightening on both sides sim- neously, A regular hand sledge should be used to strike the head of the bolt while the nuts are being pulled up. Extra bolts may be needed to pull the joint tight without excessive strain. In some cases two or three steel "C" clamps can be used effectively to bring warped joints together.

If pressure on the nut causes the washer to "bite" into the wood before the joints "pull up," substitute ⅜ by 4-in. square washers under both head and nut. A "horseshoe" washer with an opening to the edge may be placed under the head of the bolt without removing the bolt; safety requires a nail through the washer.

Shrinkage cracks or minor splits in wide thin members may be counteracted by bolt and plate collars or side plates and cross bolts. Stitch bolts through the width of thin members are often undesirable as they may require removal of too large a percentage of the net cross section of the member.

The work crew should chalk-mark all bolts as they are tightened to avoid skipping. After the tightening is completed, it may be desirable to spot paint bolt heads, washers and nuts, especially in seacoast locations, to protect them from rust.

All bolt tightening, even minor repairs, on timber structures should be under the supervision and inspection of experienced engineers.

The above was briefed from instructions for field men prepared by Verne Ketchum of Timber Structures, Inc. —THE EDITORS.

Field and Office Comment

Simplified Cube Root

Sir: In *Engineering News-Record* May 18, 1944, p. 763, appears an article "Accurate Cube Root" by Charles Herrick, at the end of which reference an example is given to a method used by me, as set forth in your January 13, 1944 issue, p. 56.

While not wishing to enter into any controversy, it appears to me that Mr. Herrick has made two mistakes in arithmetic in the solution of

$$41.4\left(1+\tfrac{1}{3}\frac{257.736}{41.4^3}\right)$$ which is correct as stated.

First: The solution of the fraction

$$\frac{257.736}{3\times 41.4^3}=\frac{257.736}{3\times 70957.94}=\frac{257.736}{212{,}873.82}$$

or by slide rule $\frac{258}{213000}=0.00121$,

not 0.012 as indicated by Mr. Herrick's figures.

Second: Mr. Herrick failed to multiply as indicated .00121 x 41.4 = 0.05009 before adding to 41.4 41.4 + .05009 = 41.45009, which is about 0.00003 from the exact root.

If the above are the correct figures, I should appreciate a correction to the test given by Mr. Herrick.

C. W. RAYNOR
Structural Engineer
Bureau of Buildings
Portland, Oregon

Sir: Working against a stop watch must have made me nervous, hence the mistakes which Mr. Raynor has found in my attempt to use his method for extracting a cube root, as outlined in the letter above. He should have told me how long it takes to solve his equation. This would have relieved me of the trouble of performing such an arduous computation.

Now that the arithmetic has been thoroughly checked, it is evident that the error of 3 in the seventh significant figure must be due to deficiencies in the equation. Mr. Raynor should have given the derivation of his equation, and computed the errors due to neglecting all but the first two terms of the infinite series that results when a binomial is expanded by the Binomial Theorem.

Most people forget how to perform cube root by the arithmetical method. The "simplified" methods that have been proposed are complicated and difficult to remember. Logarithms provide a quick, accurate and easily remembered method of performing cube root. This method requires three steps only:

1. Look up the logarithm of the number.
2. Divide this by three.
3. Look up the number corresponding to the resulting logarithm.

To focus attention on the important point, with logarithms, cube roots may be obtained in the following times; to 4 places in 50 sec., to 5 places in 1¾ min., to 7 places in 2½ min., and to 10 places in 7 min. The danger of mistakes is minimized by this simple method.

CHARLES HERRICK,
11 East 32d St.,
New York, 16, N. Y.

Simple Marking Devices Speed Drafting Operations

The simple marking devices illustrated in Figs. 1 and 2 have been found of great value in placing the points and figures for long street plan and profile surveys where many different structures must be shown, sometimes in distinguishing colors.

A gadget developed to guide the scaling and drafting of the plan view is shown by Fig. 1. In this drawing *C* is a card of about card board thickness on which is drawn a center and offset lines to required scale, *B* is a triangle thumbtacked or lightly spot cemented to the card, and *A* is a steel straightedge placed so as to allow the card to slide upon the profile or cross-sectioned paper with the center line or datum line of the card kept coincident with that of the drawing. When the left hand edge of the card is slid to a station marking on the drawing, it accentuates the offset line and scale divisions for pricking points taken from the level or transit book for that station. It also eases the drafting of all short plan lines parallel to the center line, since for that purpose a small triangle may be "set-squared" against the vertical edge of triangle B as fast as the appropriate points are plotted.

A lined and slotted card guide for inserting station elevation figures for the profiles is illustrated by Fig. 2.

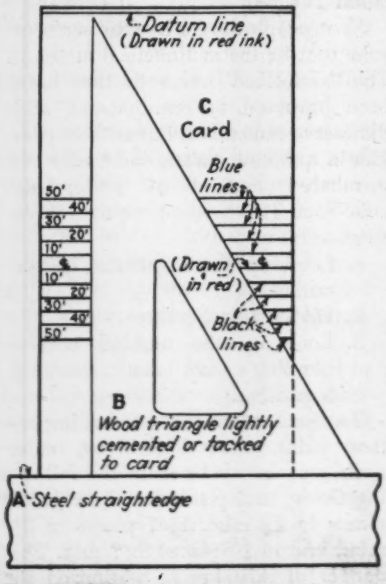


Fig. 1. When drawing plan view of street layouts a wooden triangle attached to a stiff card marked as above will simplify the work.

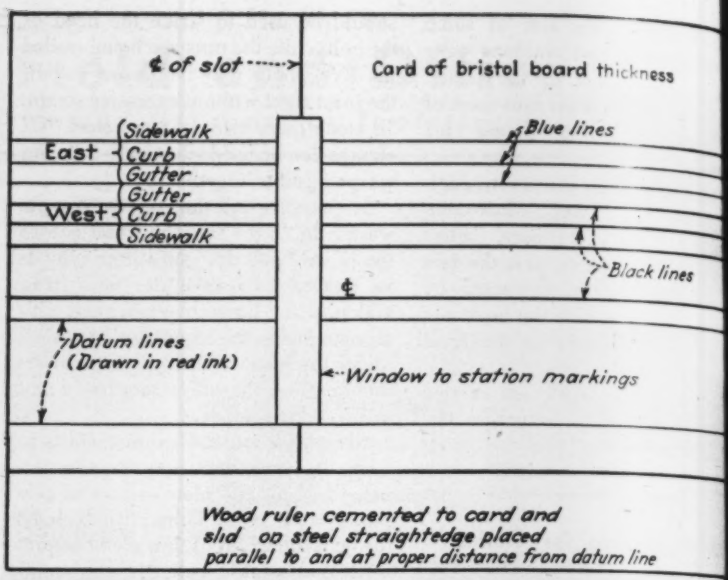


Fig. 2. A card guide may be of value when inserting station elevation figures on profile drawings.

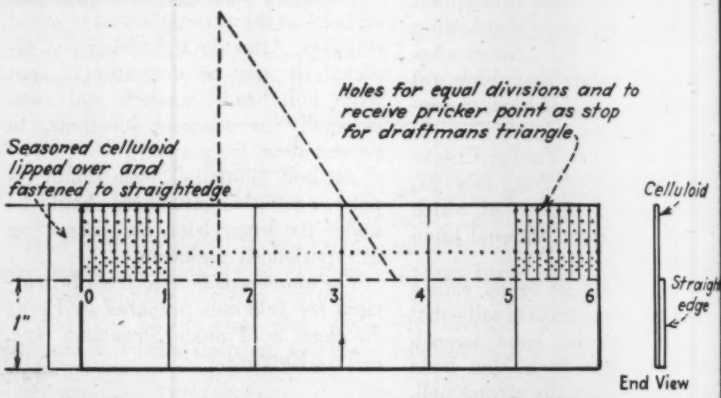


Fig. 3. Perforated diagonal scale of this type is helpful in accurately spacing lines on small scale drawings.

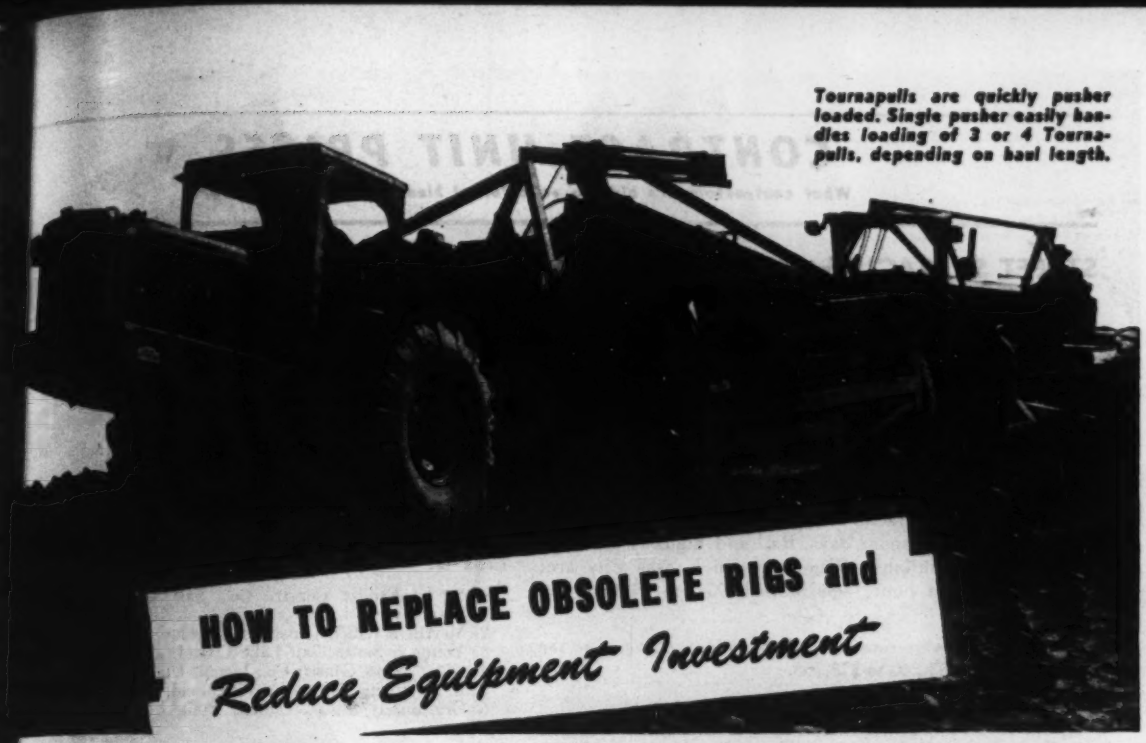
The center line of the slot having been brought to the station for any particular survey items, the positions and colors for their insertion are at once identified. This scheme is best adapted for profiles where the station plus signs and the decimal points of the figures are taken as location markers and references, all numbers being written from left to right on the sheet.

Fig. 3 illustrates a perforated diagonal scale which in combination with a set square is fitted for accurately and semi-automatically spacing lines on small scale work and for laying off lettering guide lines.

I should also like to suggest that the work of plotting and scaling (on and from) large scale survey work sheets could be helped greatly if cross-sectioned tracing cloth or paper subdivided and indexed to match the engineer's scales were manufactured. A subdivided tracing sheet of this sort could be accurately superimposed on, for example, a grid 500 ft. on a side to a scale of 30 ft. to an inch with big advantage for finding and measuring distances within that area.

The draftsman who wants to line up cross-sectioning on tracing paper for this work will find some of the commercial squared paper services able for spacing the inch divisions. Sharp lines may be transferred by using carbon paper and a needle point scriber. The latter can be prevented from scratching by holding it slantwise to the work or by using a protective piece of tracing cloth.

DANIEL D. MOLONEY
Staten Island, N. Y.



Tournapulls are quickly pusher loaded. Single pusher easily handles loading of 3 or 4 Tournapulls, depending on haul length.

HOW TO REPLACE OBSOLETE RIGS and *Reduce Equipment Investment*

USE FAST-MOVING TOURNAPULLS . . . You'll Load, Haul and Spread with Same Rig . . . Move More yardage Faster and at Less Equipment and Labor Cost

With Tournapulls you get Carryall Scraper digging and spreading efficiency plus truck hauling speeds. You eliminate such one-purpose tools as shovels and elevating graders for loading, trucks for long hauls, and special spreading tools on fills. Result: you cut equipment investment almost in half, move more yardage with fewer operators and fewer units.

MORE POWER FOR WEIGHT

The Super C Tournapull has 150 h.p., yet weighs but 31,000 lbs.—22,500 to 39,000 lbs. less than crawler-scraper outfits of comparable output capacity. And Tournapull design centers that weight and power on two big rubber-tired drive wheels to give you maximum traction and flotation for tough grades and soft underfoot conditions. These big drive tires have practically no wearing parts, reduce your maintenance costs and downtime by cushioning equipment against shock.

HAUL FROM 300' TO 3 MILES PROFITABLY

What's more, the Super C operates at 2.6 to 14.9 m.p.h.—2 to 3 times faster than the fastest crawling tractors. With it you can move dirt cheaply on both long and short hauls—from 300' to 3 miles.

Why use slow-moving, overweight equipment when you can move more yardage, more profitably with faster-moving, job-proved Tournapulls? Talk to your LeTourneau dealer NOW about replacing obsolete equipment with faster-powered Tournapulls.

Tournapulls spread their own loads on the move. Smooth fills and good haul roads, as shown here on Mannix & Company's job near Banff, Alberta, enable you to get into high gear quicker and stay there, thus increase hourly trips and yardage.

LETOURNEAU TOURNAPULLS

JOB-PROVED BY ALERT EARTHMOVERS

Also LeTOURNEAU (Aust.) Pty., Ltd., Rydalmere, N.S.W., Australia.

Manufacturers of TOURNAPULLS®, DOZERS, CARRYALL® SCRAPERS, POWER CONTROL UNITS, ROOTERS®, SHEEP'S FOOT ROLLERS, TOURNAROPE®, TOURNATRAILERS®, TOURNAWELD®, TOURNACRANES®. ®Trade Mark Reg. U. S. Pat. Off.

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RUBBER-TIRED POWER FOR FASTER EARTHMOVING

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

STREET SURFACING, KANSAS CITY, MO.

OWNER: City of Kansas City, Mo.

PROJECT: Resurfacing old streets with asphaltic concrete wearing surface in Kansas City as follows: Wornall Road between 63rd and 75th Streets; Prospect Avenue between 39th Street and Swope Parkway; and 15th Street between Jackson and Van Brunt Boulevard. Contract involves asphaltic wearing surface, and cleaning, tacking, sealing and chipping pavement.

CONDITIONS: Contractor to furnish all materials and complete work in 60 calendar days. Rail and highway transportation facilities available. Wage rates in Kansas City are: $1.40 to $1.65 per hour; semi-skilled, 95c. to $1.375; and common, 90c.

BIDS: Five bids were received July 5, 1944, ranging from the contract low of $53,240 to $75,708.

LIST OF BIDDERS:

1. Mid West PreCote Co., Kansas City, Mo. (contract) $53,240
2. Tobin Asphalt Products, Inc., Kansas City, Mo. 59,519
3. Bowen Construction Co., Kansas City, Mo. 59,528
4. Musselman & Hall, Kansas City, Mo. 72,280
5. Blue Valley Asphalt Co., Kansas City, Mo. 75,708

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Asphaltic concrete, in place	6,780 ton	$6.69	$7.45	$7.23
2. Pavement cleaned, tacked, sealed and chipped	75,064 s. y.	.105	.12	.14

OVERPASS AND APPROACHES, UTAH

OWNER: Utah State Road Commission, Salt Lake City, A. L. Anderson, state road engr.

PROJECT: Construction of concrete T-beam overpass structure 273.6 ft. long and 0.644 miles of approach-road surfacing, 26-ft. wide, on Plain City-Hot Springs Road, Box Elder County, approximately 12 northwest of Ogden, Utah. Approach-road surfacing is road-mixed bituminous material.

CONDITIONS: Contractor to furnish all materials and complete work on overpass in 150 calendar days and on road in 175 calendar days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.25 to $1.50 per hour; semi-skilled, $1.00 to $1.12½; and common, 75c.

BIDS: Six bids were received June 23, 1944 on the overpass structure, and six on the roadway items. Overpass bids ranged from contract low of $57,690 to $83,735. Engineers estimate, $79,481. On the roadway, bids ranged from $66,968 to $79,424. Engineers estimate, $65,733.

Roadway

LIST OF BIDDERS:

1. Olof Nelson Constr. Co., Logan, Utah (contract) $66,968
2. R. M. Jensen Constr. Co., Salt Lake City, Utah 69,245
3. H. W. Glenn, Midvale, Utah 72,624
4. W. W. Clyde & Co., Springville, Utah 72,854
5. Reynolds Constr. Co., Springville, Utah 79,217
6. L. A. Young Constr. Co., Richfield, Utah 79,424

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Bituminous material, type MC-2	17,800 gal.	$0.09	$0.10	$0.15
2. Bituminous material, type RC-5	2,800 gal.	.09	.10	.15
3. Cover material	140 ton	3.00	2.00	4.00
4. Scarifying and mixing	0.502 mi.	750.00	800.00	1,800.00
5. Scarifying and mixing paved shoulder and unpaved gutter, 9-ft. wide	0.311 mi.	750.00	1,200.00	1,[illegible]
6. Cr. rock or cr. gravel surf. course	5,150 ton	.85	.85	.[illegible]
7. Gravel or cr. rock base course	4,700 ton	.85	.85	.[illegible]
8. Unclassified excavation	116,300 c. y.	.23	.23	.[illegible]
9. Overhaul, Class A	705,000 sta. y.	.015	.015	.[illegible]
10. Overhaul, Class B	57,000 y. sta.	.15	.15	.[illegible]
11. Channel excavation	75 c. y.	1.00	1.25	[illegible]
12. Watering	1,830 M gal.	1.50	1.50	[illegible]
13. Rolling	1,565 hr.	3.50	4.00	[illegible]
14. 15-in. concrete pipe	57 l. f.	3.00	3.50	[illegible]
15. Excavation for structures	50 c. y.	1.00	1.50	[illegible]
16. Guide posts	54 ea.	5.00	6.00	[illegible]
17. Right-of-way fence, type A	2,100 l. f.	.20	.16	[illegible]
18. Moving fence	250 l. f.	.15	.10	[illegible]
19. Removal of existing pavement	2,000 s. y.	.75	.75	[illegible]
20. 16-ft. gates	3 ea.	25.00	25.00	[illegible]
21. Federal-aid project markers	2 ea.	20.00	20.00	[illegible]

Overpass Structure

LIST OF BIDDERS:

1. S. E. Faddis Constr. Co., Salt Lake City, Utah (contract) [illegible]
2. Merrill & Lauch Constr. Co., Ogden, Utah [illegible]
3. Young & Smith, Salt Lake City, Utah [illegible]
4. Olof Nelson Constr. Co., Logan, Utah [illegible]
5. L. A. Young Constr. Co., Richfield, Utah [illegible]
6. Ora Bundy & Co., Ogden, Utah [illegible]

Item	Quan.	Unit Prices (1)	(2)	
1. Excavation for structures	450 c. y.	$2.30	$4.00	[illegible]
2. Concrete, Class A	1,210 c. y.	28.00	30.00	[illegible]
3. Concrete handrail	596 l. f.	4.00	7.30	[illegible]
4. Structural steel	3,500 lb.	.26	.20	[illegible]
5. Reinforcing steel	235,000 lb.	.055	.055	[illegible]
6. Piling, treated	4,200 l. f.	1.43	2.00	[illegible]
7. 6-in. perf. corr. galv. metal pipe underdrains	92 l. f.	.73	1.25	[illegible]
8. 6-in. corr. galv. metal pipe	288 l. f.	.72	1.25	[illegible]
9. Furn. pile driving equipment	Lump Sum	275.00	500.00	[illegible]

WATER MAIN, CLEVELAND, OHIO

OWNER: City of Cleveland, J. H. Hamlin, engineer.

PROJECT: Furnishing pipe and constructing 42-in. st[illegible] water main for Spruce Avenue Water Main, Cleveland, Oh[illegible] Also involves salvaging approximately 830 ft. of 42-in. c[illegible] iron water main as specified by the engineer.

CONDITIONS: Contractor to furnish all steel pipe and co[illegible] plete that portion of the work in 30 calendar days. This[illegible] days also allowed for salvaging cast iron pipe. Rail, highw[illegible] and water transportation facilities available to Cleveland, [illegible] highway facilities available to site of work. Wage rates spe[illegible] fied are: hoisting engineers, $1.875 per hour; and comm[illegible] labor, $1.035 per hour.

BIDS: Nine bids were received April 28, 1944 ranging fr[illegible] the low of $55,596 to $107,800.

LIST OF BIDDERS:

1. Lake City Constr. Co., Shaker Heights, Ohio (low bidder) $55,5[illegible]
2. Kalill Co., Cleveland, Ohio 60,[illegible]
3. Domenic Nero Constr. Co., Cleveland, Ohio 63,[illegible]
4. D. M. Sylvester & P. DiPaolo Constr. Co., Cleveland, Ohio 64,[illegible]
5. National Construction Co., Cleveland, Ohio 67,[illegible]
6. Herkner Constr. Co., Cleveland, Ohio 73,[illegible]
7. Said S. Haddad, Cleveland, Ohio 84,[illegible]
8. Fred Haddad, Cleveland, Ohio 93,[illegible]
9. Curro Construction Co., Cleveland, Ohio 107,[illegible]

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Furnish and construct 42-in. steel water main	1,160 l. f.	$44.00	$46.95	$[illegible]
2. Salvage 42-in. cast iron water main	830 l. f.	6.00	8.35	[illegible]

Our troops inspect a captured Axis tank, looking for booby traps
INTERNATIONAL NEWS PHOTO

Every battle is a showdown . . . our men, weapons and equipment against the enemy's . . . *wire rope* included. That's why our forces need the best rope they can get . . . *and lots of it.* Below are some of the ways in which *you* can help to send more wire rope over there by making your own rope *last longer* over here:

1. Start with the correct wire rope. If uncertain about size, grade or construction for your specific job, ask us or any distributor.

2. Check equipment thoroughly. Repair or replace worn, corrugated or wobbly sheaves. Line up sheaves with each other and with drums, making sure rope does not rub against flanges. Inspect drums for roundness.

3. Install rope carefully. Avoid kinking when unreeling and handling. Never drag rope across concrete or gravel. Wrap rope snugly and evenly on drum, avoiding cross-winding.

4. Break in rope cautiously, gradually increasing speeds and loads. And break in the operator, if inexperienced. Instruct him in the importance of smooth starts and stops . . . reasonable loads . . . frequent examination of rope, sockets, clips and splices.

5. Care for your rope. Clean and lubricate regularly. On many installations rope can be cut off or shifted to distribute wear. Get better acquainted with ropes by sending for our free Industrial Wire Rope Hand Book and Riggers' Hand Book.

One thing more: Use wire rope of known stamina and dependability. *Preformed* Yellow Strand combines flexibility, toughness, elasticity and strength in proper balance. It stays on the job . . . curtails replacements . . . helps you keep manpower and equipment producing . . . for Victory.

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle
Factories: St. Louis, Seattle, Peoria

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YELLOW STRAND
PREFORMED WIRE ROPE

WYTEFACE
"A"
STEEL TAPES

GRADUATED IN INCHES OR TENTHS

EASY-TO-READ, *raised* black graduations on crack-proof white surface . . . resist abrasion from rock, sand, scraping over rails, pipe, concrete, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

KEUFFEL & ESSER CO.

NEW AIDS TO THE CONSTRUCTOR

Plywood Tubing

Fabricated from thin veneers and a thermosetting synthetic resin, "Plytube," a new plywood tubing, is built up so that stress or strain in any direction will act upon the total columnar grain fibers of the veneer layers. Urea formaldehyde is now its bonding agent, but the more critical phenol may also be used. Plytube is said to be water-, flame-, splinter- and rot-proof. If coated, Plytube will carry chemicals, gasoline and oil. It can be threaded on the job with ordinary pipe dies.

Plytube is available at this time with inside diameters from ½ in. to 18 in.; wall thicknesses from .05 in. to .50 in.; in any reasonable length. However, tubes ¼-in. O.D. to 24-in. O.D. have been made and the manufacturer is building an automatic winding machine to produce tubing endlessly. Plytube has been used for sectional life raft oars, motor shafts, radio antenna masts up to 90 ft. high, ship railings, and oil reservoirs, as well as construction beams, columnar posts, etc.—*Plymold Corp., Lawrence, Mass.*

Boom Stop Control

Preventing a crane boom from ris beyond safe elevation, a new Thom automatic boom stop control, air vacuum-driven, disengages the ma drive clutch instantly when the boo is raised above safe limits. The contr valve is mounted on the cab frame line with one boom leg; its operati causes the spring-loaded clutch boost cylinder to stop further boom raisin

This control stops the boom witho shock, the manufacturer states, an thus places no dangerous strains on —*Industrial Equipment Co., 59th an Doyle Sts., Emeryville, 8, Calif.*

• • •

Gear-Flush System

Developed to provide maximum spee in flushing dirt from marine reducti gears, the new Winslow Giant-Flo sy tem has a battery of large-capaci filters inserted directly in the ma lubricating oil line. The filters are co nected together in parallel by integr inlet and outlet manifolds, the filter el

Digging An Axis Grave

American Bullgrader ging, literally, an Axis ve is symbolic of the s dirt-moving equipment done to speed com- e Victory. On every nt, the work of bull- zers, Dozershovels, scrap- , etc., hastens the final neral of the frenzied natics.

every front, too, Bucy- -Erie tractor equipment e the Bullgrader above is in the thick of it. utstanding as always, now it is helping pre- re the Axis burial.

N-71C

A Bullgrader digs a burial place for [illegible]

A Bullgrader begins preparing a road at Torawa. (Official U. S. Marine Corps Photo)

Most of our production must still go to our armed forces; a limited number of machines is, however, now available for high priority civilian operations. Be sure to see your International TracTracTor Distributor for information on new machines, rentals, and service.

CYRUS-ERIE CO., SOUTH MILWAUKEE, WISCONSIN

A Bullgrader—two-wheel scraper dual unit maintains a road on a S. W. Pacific isle. (Official Navy Photo)

A Dozershovel [illegible] Guadalcanal. (Official U. S. Marine Corps Photo)

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Light, strong, rigid, easily handled.

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General Office and Plant, WASHINGTON, PA.

ment cases are steamjacketed to raise the oil temperature to approximately 140 deg. F.

Each Winslow oil conditioner contains

57 individual filtering elements, with a total area of more than 4,700 sq. in. Model J-57-930-A flushing unit handles 75 gpm. of SAE 30 oil.—*Winslow Engineering Co., Oakland, Calif.*

. . .

Industrial Chairs and Stools

Featuring all-welded steel frame for strength, a new line of chairs and stools emphasizes comfort and efficiency for industrial workers. Protruding bolts and other sharp surfaces have been eliminated. Single-bolt adjustment is made by

means of a sliding tube in each leg; these tubes are zinc plated and punched at intervals to receive the adjusting bolt.

Properly curved backrests are mounted on spring steel uprights, which adjust up and down for support and good posture. Seats of non-splintering Masonite are furnished in scroll or round type.—*Royal Metal Mfg. Co., Chicago, Ill.*

. . .

Three-Way Foot Valve

Useful on tools where operators should have both hands free, a new compressed air foot valve speeds handling of work. Furnished in locking and non-

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For Sales, Rentals and Service on BLUE BRUTE Portable Compressors, Rock Drills and Air Tools.

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Worthington Pump and Machinery Corp

$550,000,000 READY FOR CONTRACT

New, streamlined Blue Brutes will also be ready when Victory gives the green light to city budgets.

A rough estimate of advance plans of cities under 1,000,000 population shows $550,000,000 of improvements ready for contract, $1,600,000,000 being surveyed, and $3,780,000,000 being studied.

Whatever the job, you'll need rugged, dependable air compressors like the Worthington Blue Brute 210-footer shown above.

Exclusive features — years of engineering experience — make Blue Brutes save your time and money.

Feather Valves*, for instance, lightest, strongest, most efficient valves ever designed for air compression — full force feed lubrication — 3-point suspension, "cradling" engine and compressor — features like these knock downtime *down*, speed the job, avoid delays that threaten profits.

In brief, Blue Brute compressors deliver *more* air. Blue Brute air tools use *less*. And the complete line . . . Diesel, gasoline or electric driven compressors . . . tools for *every* purpose . . . means you'll get the right equipment for the job.

Your nearest Worthington representative will help you choose Blue Brutes to fit your post-war plans. Act now! Your nearest distributor is listed on page 118.

*Reg. U.S. Pat. Off.

PC4-18

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From the Alaskan highway to swamp-ridden Australian jungles, Blue Brutes are at work today. The same rugged, trouble-free performance that helped push the roads through to fighting fronts . . . that went to work in hundreds of Army Camps, Navy Yards, air bases here at home . . . will be *yours* when war's won, to win the peace that will follow.

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WORTH WORTHINGTON

Worthington Pump and Machinery Corporation Construction Equipment Division, Holyoke, Massachusetts

The gear teeth in your Fuller transmission may not be shaped like the tear-drop . . . the root from which all streamlining stems, but in practice they are similar. In their research, Fuller engineers sought a design which would provide simplicity, strength, and resistance to wear, plus smooth, quiet gear-meshing. The resultant streamlining of the Fuller gear tooth, as radical a departure from standard practice as the streamlined train, is the reason why Fuller transmissions run quietly, shift easily and wear longer.

FULLER MANUFACTURING COMPANY, KALAMAZOO, MICHIGAN
Transmission Division
Unit Drop Forge Division, Milwaukee, Wisconsin

locking types, the valve mechanism simple. An adjustment of the lo

locking device prevents engagement the operating pedal, and changes locking type to nonlocking.

The ruggedly constructed valve ha heavy cast iron body and neoprene va seat; its net weight is 12½ lb.—*Ke Tool Co., Grand Haven, Mich.*

• • •

Bronze Water Meters

With the resumption of water me manufacture under amendment to W Order L-154, it is announced that t line of Empire "Streeemline" water m ers has been expanded. This bron cased meter is now available in ⅝ i ⅝x¾ in., ¾ in. and 1-in. sizes.

The same general construction is us for all sizes, embodying a balanced o cillating piston operated in a two-par snap joint measuring chamber, and a oil-enclosed gear train. All workin parts are assembled without screws o bolts.

A breakable cast iron bottom pla provides frost protection, it is claime by permitting interior castings to sep rate to relieve parts from strain and di tortion.—*Pittsburgh Equitable Met Co., 400 North Lexington Ave., Pitt burgh 8, Pa.*

• • •

Small Pipe Gage

Now modified to measure all sizes o electrical conduit and metallic, thi wall tubing as well as pipe from ⅛ i

to 12 in., the latest model of the Three Point Gage is of steel, with black rust proof finish. The deeply etched num

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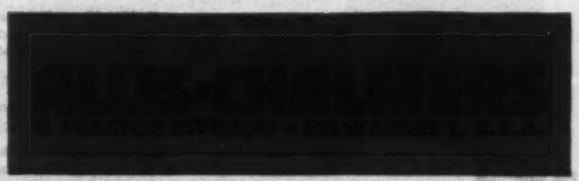
put SAFETY FIRST in Road and Street Construction

"The United States cannot afford—socially or financially—the tragic waste represented by the 39,969 traffic deaths in the last pre-war year of 1941."*

Traffic safety has gained tremendously in importance. It was recently made the postwar aim of some 40 prominent national organizations, as announced through the National Safety Council. Officials who put Safety First in their maintenance and construction will receive the thanks and blessings of everyone.

Worn-out roads and streets will have to be reconditioned hurriedly . . . new arteries constructed without delay . . . to handle the expected, increased postwar traffic *safely!*

To put Safety First in postwar construction . . . and put it there quickly . . . use up-to-date equipment — fast-moving Allis-Chalmers tractors and Motor Graders, powered with General Motors 2-Cycle Diesel engines. Only modern machines can do the job right, in shortest time, at lowest cost! Consult your Allis-Chalmers dealer about your future equipment needs!



***Kenneth D. Colman, Seattle, Washington, businessman, head of a special committee that drafted postwar safety program for 40 national organizations. Sponsoring groups represented business and industry, labor, agriculture, war veterans, women, police, public officials and professional agencies interested in safety.**

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Flexible... Adaptable... Relatively Inexpensive... Conveyors as Haiss builds them are the logical answer where man-shortages make each workman's labor precious.... Haiss Portable Conveyors are engineered jobs, with loads carried on high-grade ball and roller bearings. Frames are truss-designed for strength without excess weight.

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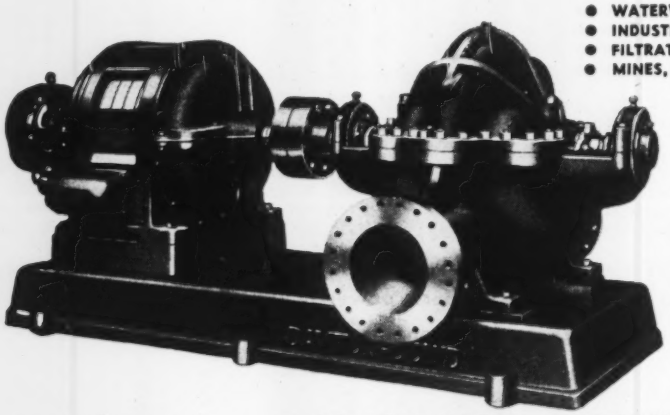

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PUMPING SERVICE

TYPES — Single stage, single suction, sizes 2" and 3". Single stage, double suction, sizes 2½" to 42". Capacities up to 60,000 G.P.M.

SPLIT CASE DESIGN — For easy accessibility. Available in either cast iron, chrome iron cast steel, bronze, monel and other alloys.

IMPELLER — High efficiency design. Made of cast bronze. Also available in KA-2 stainless steel, cast carbon steel monel or other alloys.

DRIVE UNITS — Pumps can be supplied with dual drive hookup. Electric motor and steam turbine. Electric motor with gas engine. Twin pumps also available with one electric motor.

FREE CATALOG—Write on your business letterhead for interesting FREE Catalog. Address: DAYTON-DOWD COMPANY, Dept. R-11, Quincy, Illinois.

DAYTON-DOWD
Turbine Pumps • Centrifugal Pumps

erals are filled in with white enamel.

This pocket size patented device measures 2¾x4½ in., and is available with or without a leatherette case. The gage functions in the same way as earlier models.—*Three-Point Gage Co., 3821 Broadway, Chicago 13, Ill.*

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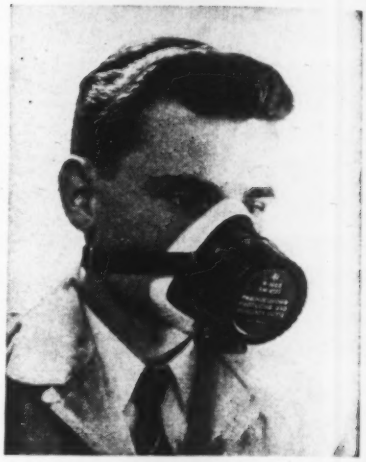
Respirator Facelet

A respirator is said to be more comfortable to wear when it is equipped with a new knitted cotton facelet. This facelet is soft and absorbent, and in a



measure protects the face against dust and dirt, according to the manufacturer's statement.

Designed for use with a R-1000 respirator, this AO facelet will fit most standard respirators.—*American Optical Co., Southbridge, Mass.*

• • •

Plastic Tape

Highly flexible and elastic, a new many-purpose plastic tape, "Fibron," is manufactured from Vinylite resin. Said to be heat-sealing, flame resistant and high in dielectric and mechanical strength, this tape has many insulation and protective uses. A sample will be sent on request.—*Irvington Varnish & Insulator Co., Irvington, 11, N. J.*

• • •

Safety Goggle

Of 44.6 mm. size and special eyecup shape, a new safety goggle for women workers is fitted with clear flat Super Armorplate lenses. Although light in weight for comfort, this goggle is said to be very durable. Each eyecup is designed individually to fit the orbit of the eye. The goggle, low set for wide angle vision, has an insulated, easily adjusted ball-chain bridge and adjustable headband.—*American Optical Co., Southbridge, Mass.*

Association Elections and Activities

New member of the Wisconsin Society of Professional Engineers include Charles A. Robertson, William B. Tucker and Charles D. Wilson of Allis-Chalmers, Milwaukee, and Robert J. Strass, Worden & Allen, Milwaukee.

Joe Kellum was elected president of Birmingham Chapter, Foremen's Association of America, at recent meeting. Other officers are Barney McCullar, vice president; Albert Schober, treasurer, and Clarence Roberson, secretary.

Arthur A. Knock, Canton, Ohio, contractor, was elected regional vice president and a member of the legislative committee of the Ohio Home Builders Association at its recent meeting in Columbus. Wilburn Kerr, Columbus, was elected president and G. J. Goodreau of Cleveland vice president.

Representative Sid Simpson of Carrollton, Ill., has been elected to a 2-year directorship of the National Rivers and Harbors Congress.

H. F. Schatter of Miami, Fla., was re-elected president of the American Society of Sanitary Engineers at the annual convention of that organization held in St. Louis recently. Other officers are: J. R. Walker, Waterbury, Conn., secretary, and T. M. Dugan, McKeesport, Pa., treasurer.

The Canadian Engineering Standards Association has changed its name to the Canadian Standards Association; its functions will be broadened to include standardization of industrial materials and processes other than those within the field of engineering.

Founded in 1919, the association has been responsible for the preparation and publication of about 180 standard engineering specifications and codes; about 20 more are about to be published. It is affiliated with the National Research Council of Canada and is supported by grants from government and industry.

The Asphalt Institute of America has established headquarters in Billings, Mont., to serve seven northwest states, including Washington, Idaho, Utah, Montana, Wyoming, North Dakota and South Dakota. J. R. Banning heads the new office.

Builders of the West, Inc., opened Pacific Northwest headquarters in Seattle, Wash., Aug. 29, under the direction of Frank C. Jackson, Seattle, according to B. F. Modglin, San Francisco, president of the organization. The Seattle office will direct Builders of the West Activities in Washington, Idaho and Montana. Others offices will be opened in Portland, Ore., Phoenix, Ariz., Salt Lake City, Utah, Denver, Colo., and Los Angeles, Calif.

The Carolina Road Builders Association, a non-profit, non-commercial corporation, incorporated June 14, 1944, to serve those interested in highway development and construction in North and South Carolina is governed by a board of governors consisting of the president, Nello L. Teer, Jr., Durham, N. C.; one vice-president, E. H. Hines, Greenwood, S. C.; and four governors, two from each state, F. D. Cline, Raleigh, N. C.; W. E. Graham, Cleveland, N. C.; John R. Suber, Whitmire, S. C.; and T. R. McMeekin, Cheraw, S. C. The office of the association is located at 613 Commercial Bank Building, Raleigh, N. C.

Hal M. Davis of R. B. Everett & Co., Houston, has been elected director of Region 10, the states of Texas, Aklahoma and part of New Mexico, Associated Equipment Distributors, for 1944.

Raymond Chase, of the City Engineering Department of Jacksonville, Fla., has been elected president of the Jacksonville Post of American Military Engineers.

Other officers named were John F. Reynolds, first vice president; Bernard Close, second vice-president; Leo L. Burnet, secretary, and Miles Thomas, treasurer.

The board of directors for the coming year will be Lieut. Comdr. E. Thouren, USNR., Col. A. B. Jones, district engineer, and James Ingram.

The city of Asheville, N. C., following a special survey, has announced a proposed postwar public works program of $2,500,000. Included are the development of the North Fork watershed at a cost of $1,200,000, with an impounding dam; a new sewage disposal plant; street rehabilitation, and other projects. City Manager Pat. M. Burdette has filed a report of the survey with the regional Federal Works Agency office at Richmond, Va., to be included in recommendations on postwar planning legislation to be presented to Congress.

More

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• Now it's easier for you to get BATES•GRATES. That means you can have stronger, safer open steel flooring and stair treads in your plant, by utilizing the engineering advantages of BATES•GRATES.

Extra strength, safety—*plus* easier maintenance—are due to the low-temperature, pressure-welding of hot rolled steel Hex cross bars to main bars. These qualities are obtainable only by using the Hex, fillet-welded design . . . and they cost nothing extra.

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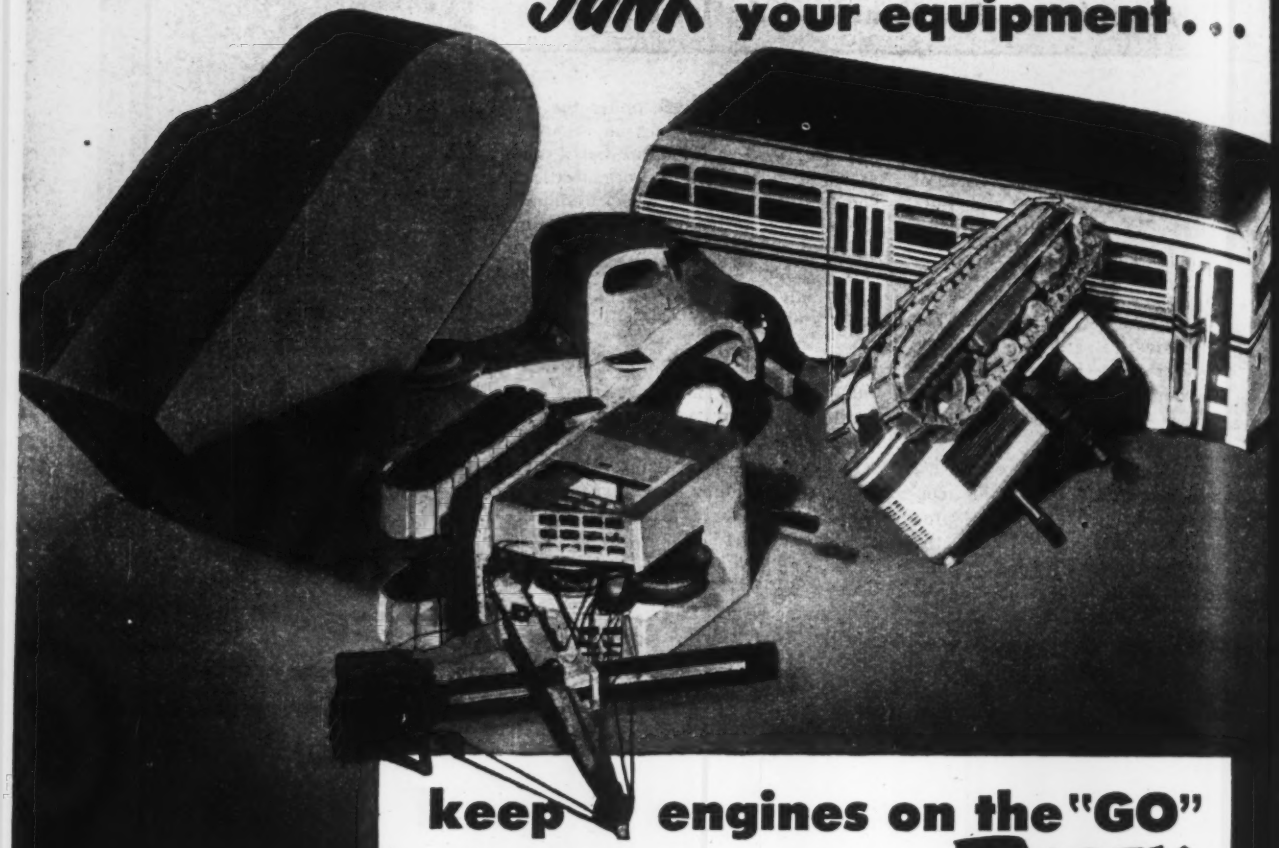

keep engines on the "GO" with hard-working TALPEX

Equipment is going to the scrap heap fast enough without speeding the trip with a "lazy" oil.

Under normal operating conditions a "lazy" oil might get by. But today, when engines are being worked twice as hard and their operation is twice as important, no operator can afford to take chances with a "lazy" oil . . . one that doesn't have *all* the properties needed to do a complete job of lubrication.

You can't tell whether or not an oil is "lazy" until you give it a job to do. Then it's too late. But of one thing you can be certain; to keep your equipment operating at peak efficiency the oil you trust with the job of lubricating your engines must have *all* of the following properties of new Shell Talpex.

NEW SHELL TALPEX

—**IS NON-CORROSIVE TO ALLOY** bearings. Protects all lubricated engine parts against corrosion.

—**HAS EXCEPTIONAL OXIDATION STABILITY.** Holds to a minimum the formation of sludge, lacquer and other products of deterioration.

—**HAS HIGH DETERGENCY.** Helps keep carbon, lacquer and foreign particles from adhering to pistons and rings, valves, ports.

—**HAS LOW CARBON-FORMING TENDENCY.** Reduces ring sticking and wear. Lengthens engine life.

If the oil you now use doesn't have *all* these properties, it's lazy . . . should be changed to hard-working Shell Talpex. Ask the Shell man to show you why.

SHELL

TALPEX

THE NEW, ALL-PURPOSE, HEAVY-DUTY LUBRICANT

For trucks, busses, tractors, shovels, stationary and marine Diesels

MANUFACTURERS' ACTIVITIES

N. A. HOLMER, formerly director of sales and marketing for the Elastic Stop Nut Corp., of Newark, N. J., is now general sales manager of the Carney Cement Co. and the Carney Rockwool Co., with quarries and plants at Mankato, Minn.

The general sales office of the Carney companies will be in the St. Paul Midway district, at 2478 University Avenue. Mr. Holmer and the Carney sales staff will move to the St. Paul offices from Mankato.

N. A. Holmer was formerly general sales manager of the Mid-State Steel & Wire Co., of Crawfordsville, Ind., distributing farm steel products to a national market of jobbers, lumber dealers, building and hardware supply outlets. Previously he headed sales for Unity Mills Distributing Co., distributing steel products, and building materials in the northwest.

FLOYD R. WILSON, Montclair, N. J., has resigned as vice president and director of Ransome Machinery Co., Dunellen, N. J., a subsidiary of Worthington Pump & Machinery Corp., Harrison, N. J., and has terminated his connection with the company.

A BOOM in the asphalt business after the war was predicted by C. L. Vandenburgh, general manager of the Trinidad Lake Asphalt Co., of Trinidad, in an interview at Niagara Falls, N. Y. He said that Great Britain and the United States work harmoniously in Trinidad, and that American business men receive every courtesy and cooperation from citizens and the government.

JOHN A. LITTLE, 54, comptroller, Welsbach Engineering and Management Corp., died in Philadelphia recently.

Mr. Little joined the Welsbach organization as an office boy in 1906, and, except for nearly two years' service in the army during the First World War, including active service in France, his employment was uninterrupted with Welsbach and its subsidiary companies, such as Kitson Co., Ozone Processes, Inc., and Welsbach Street Lighting Co. Mr. Little was elected

HI-DENSITY

MICROTOMIC VAN DYKE DRAWING PENCILS

...for Sharp, Readable PRINTS

Tracings you can reproduce with clarity down to the finest detail—that's an *extra* you get with the Hi-Density lead in your MICROTOMIC VAN DYKE. The smoothness of this superlative drawing pencil brings you economy of effort, hence better work. 18 uniformly graded degrees. Ask a Van Dyke dealer to prove these important statements.

FOR 25¢ POSTPAID A VAN DYKE 20" CIRCULAR SLIDE RULE

EBERHARD FABER PENCIL COMPANY
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Here is my 25¢ . . . please mail Slide Rule at once, to

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EVEN TIGER BRAND NEEDS IT!

Add life to your wire ropes with LUBRICATION

One of the most frequent causes of premature wire rope failure is lack of proper lubrication. Yet lubrication is such a simple means of extending rope life that it seems incredible that rope users should overlook it. But they do.

Every American Tiger Brand Wire Rope comes to you from the factory, properly lubricated and ready for service. But factory lubrication, no matter how efficient, will not last the life of the rope. Field lubrication at regular intervals is absolutely essential. Wire rope is a machine, composed of many working parts. It requires periodic lubrication to reduce frictional wear.

Use a well-tested lubricant like Tiger-Lube which has been developed through years of study and research. Be sure that the rope surface is clean and that the lubricant is applied uniformly and thoroughly.

Lubrication is insurance against corrosion and is the safest way to prevent excessive internal and external rope wear. Lubrication will materially assist in controlling the wear on sheaves and drums and in prolonging rope life, resulting in increased operating efficiency.

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USS

United States Steel Export Company, New York

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UNITED STATES STEEL

assistant secretary of the group in 1940, and became comptroller in 1941.

E. E. QUIMBY has been chosen commercial vice president of Economy Pumps, Inc., Hamilton, Ohio, specializing in sales transactions for large projects too involved for a resale agency, such as flood control work, etc. Mr. Quimby is widely known as senior partner of Quimby-Ryan, 1 East 42nd St., New York City. His firm has represented Economy pumps since 1928 and he will continue his active connection with Quimby-Ryan in addition to his new relation with Economy. Mr. Quimby has a background of 25 years in the pump industry. For several years he was sales manager for the Quimby Pump Co. and later was vice president and general manager of the Sundh Electric Co. of Newark, N. J. When that company was sold to the Clark Controller Co. Mr. Quimby joined with E. T. Ryan in forming the Quimby-Ryan Co. His engineering schooling was received at the Drexel Institute, Philadelphia.

ALEXIS J. DIAKOFF has been appointed consulting engineer of the diesel engine department of the Schenectady plant of American Locomotive Co.

Mr. Diakoff goes to American Locomotive from the University of North Dakota where he was head of the mechanical engineering department.

Early in his career Mr. Diakoff was chief engineer of the submarine "Burevestnik" of the Russian Black Sea fleet. The fleet was evacuated to North Africa. He was then put in charge of consultation and operation of diesel and gas power plants in Tunisia and Algeria.

Later Mr. Diakoff was connected with the diesel department of the Rennault Works, near Paris. In that capacity he tested installations and was designing engineer of diesel engines. During this period he worked with Professor Arschaloff on the latter's solid injection system. Mr. Diakoff also made a special study of internal combustion engines at Ecole Arts et Metiers in Paris.

In 1923 Mr. Diakoff came to the United States to be associated with the Ford Motor Co. and later the Detroit Edison Co. as a designing engineer.

Photos courtesy Pan American Airways.

In Yucatan . . . for Pan American Airways; in any spot . . . for you, a Novo Diaphragm Pump does the job. Novo Diaphragms help keep your Profit HIGH and your Job DRY!

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NOVO ENGINE CO., 200 Porter St., Lansing, Mich.

Please send me bulletin No. 167-C with full information about Novo Diaphragm Pumps.

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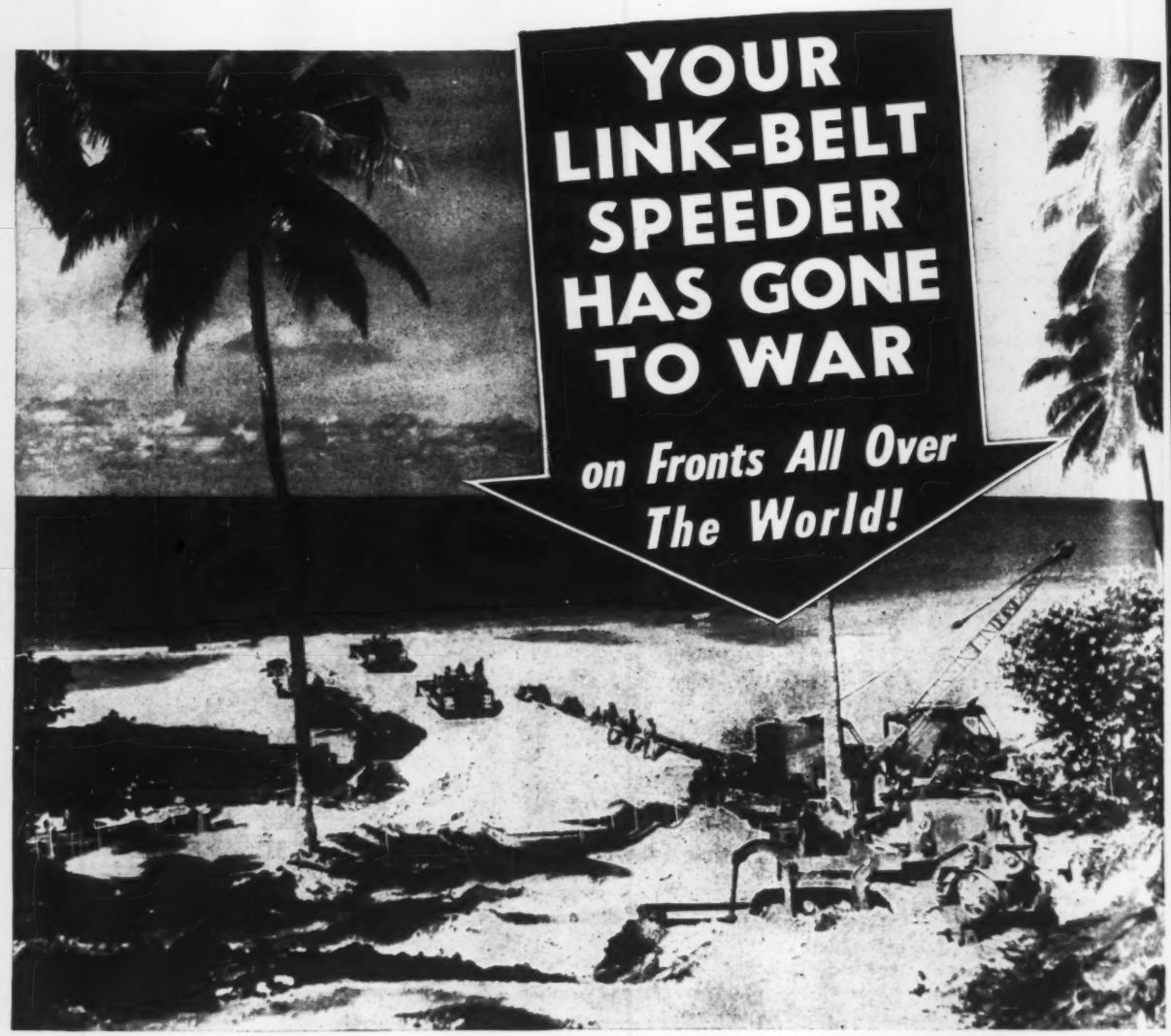

● These easy-to-handle, rugged machines can be found on battle fronts all over the globe. Construction battalions everywhere are using them to build landing strips, lay road beds and perform the dozens of other tasks that must be done in order to secure captured territories for further attack on the enemy!

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In cooperation with the Government program to use critical fuel.

. . . and if it's pipes that need covering — or re-covering — Fiberglas PF Pipe Insulation is the answer. It provides a highly efficient and convenient method of insulating steam and other hot lines of all sizes up to 30" O.D. for temperatures up to 600° F.

Fiberglas PF Pipe Insulation is exceptionally lightweight, consisting of fine glass fibers bonded with a thermosetting binder and molded into hemi-cylinders and segments.

The unusually low thermal conductivity of Fiberglas PF Pipe Insulation produces significant direct savings of heat and power. And the unique characteristics of this material bring installation and maintenance economies that have also helped to win industry-wide approval and acceptance.

Because of its mechanical strength, this pipe covering holds its shape, withstands handling and is easily applied, even on the largest pipes—where only three segments are required. The material is easily cut with a knife and the fibrous ends of sections interlace to form tight joints.

Fiberglas does not rot or decay, disintegrate or pack down under vibration.

For more information on Fiberglas Pipe Insulation or the many other uses of Fiberglas, write for booklet, "Fiberglas Insulations for Industry", *Owens-Corning Fiberglas Corp., 1840 Nicholas Bldg., Toledo 1, Ohio. In Canada, Fiberglas Canada, Ltd., Oshawa, Ontario.*

OTHER FIBERGLAS INSULATIONS

1. No. 60 PF Block—Same materials as in PF Pipe Covering—in blocks 6" x 36" and 12" x 36", standard thicknesses.

2. OC-1800 High Temperature Block—A highly efficient and rugged molded block in sizes 6" x 36" and 12" x 36"—in standard thicknesses. Will withstand surface temperatures up to 1800° F.

3. Metal Mesh Blankets—With mesh wire or expanded metal on one or both sides. Light weight, and easily applied, 2 ft. x 4 ft. and 2 ft. x 8 ft. In standard thicknesses. Two types: For temperatures up to 600° F. and 1000° F.

4. Blanket Type Pipe Insulation—With mesh wire on outer side to wrap around pipe and secure with wire through special edging. Manufactured in 2-ft. sections for pipes over 3" O.D. Will withstand temperatures up to 1000° F.

5. Insulating Cement—For insulating fittings, valves and all irregular surfaces. Highly efficient . . . withstands temperatures up to 1200° Fahrenheit.

6. OC Mastic—An asphalt emulsion cement for insulated pipe and equipment exposed to outdoor or high moisture conditions.

7. TW - F Wool—Fabricated in hats, rolls and bulk. Used for drying-ovens, heaters, etc., for filling irregular spaces and for fireproofing.

8. PF Board—Manufactured in 5 densities from 2½ to 9 lbs. per cu. ft.—standard sizes 24" x 48", 1" to 4" in thickness. For insulated panels, sound absorption and various structural applications.

9. PF Roof Deck Insulation—9 lb. density with facing to facilitate mopping. Highly efficient, fireproof, rotproof and moisture-resistant board, for application under industrial built-up roofings. Sizes 24" x 48". Thicknesses from 3/16" to 2".

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Saves Time, Handling Equipment, and Truck Mixer Miles

• Eliminates the expense and time waste of long hauls. Easily towed to the most advantageous point in the pouring area, and quickly set up for fast, efficient operation. Meets all state highway requirements as to weight and over-all dimensions. Levers grouped in one central location making it practical for one man to control all batching operations.

Johnson patented charging skip provides pre-mixing and pre-shrinkage which compares favorably with the best results obtainable in modern permanent batching plants. This charging skip has a capacity of 33 cubic feet for aggregate and 10 cubic feet for cement. Batching cycle is 90 seconds. Gumming and excessive wear is eliminated because of effective intermingling of aggregate and cement by Johnson charger skip before the batch comes in contact with wet mixer opening and walls. Write for full details.

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BULK CEMENT HANDLING EQUIPMENT
CEMENT STORAGE BINS
CONCRETE BUCKETS
BATCHERS

the C. S. JOHNSON COMPANY
CHAMPAIGN • ILLINOIS

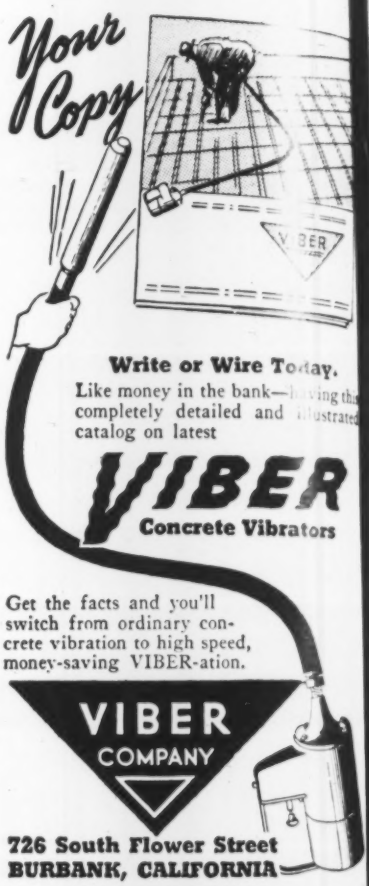
THE ASPHALT INSTITUTE has announced that the Pacific Coast Division has appointed W. A. Bugge district engineer for the territory comprising northern California, Oregon, and western Washington, with offices at 301 Wilcox Building, Portland, Ore., and 1304 Fourth Ave., Seattle Wash.

Mr. Bugge's engineering experience, starting with the Washington State Department of Highways, covers twenty-two years, including long service as county road engineer of Jefferson County and during the past four years as city engineer of Port Townsend. He is a past president of the Washington State Association of County Engineers.

FRANK C. ANGLE, manager of sales activities in the Pacific region, has been appointed manager of all Allis-Chalmers field sales offices of the general machinery division and their operations, according to an announcement by W. C. Johnson, vice president. He will continue to supervise operations of the Pacific region.

Mr. Angle was appointed manager of the Pacific region in 1943 and placed in charge of all Allis-Chalmers sales and engineering facilities serving industries in the Pacific Coast area. Prior to that he had been manager of the Allis-Chalmers San Francisco district office for seven years.

B. F. LEASE, sales manager of Athey Truss Wheel Co., Chicago, has been elected vice-president in charge of sales, advertising and service. Mr. Lease started with Athey in 1931 as special representative, with rapid advancements to district representative; manager, service and research; manager domestic sales and now vice-president. Mr. Lease has had many years experience in field and distributor contacts in the heavy equipment industry, having served from 1917 to 1931 in various capacities with the Republic Truck Co. and Lynn Manufacturing Co.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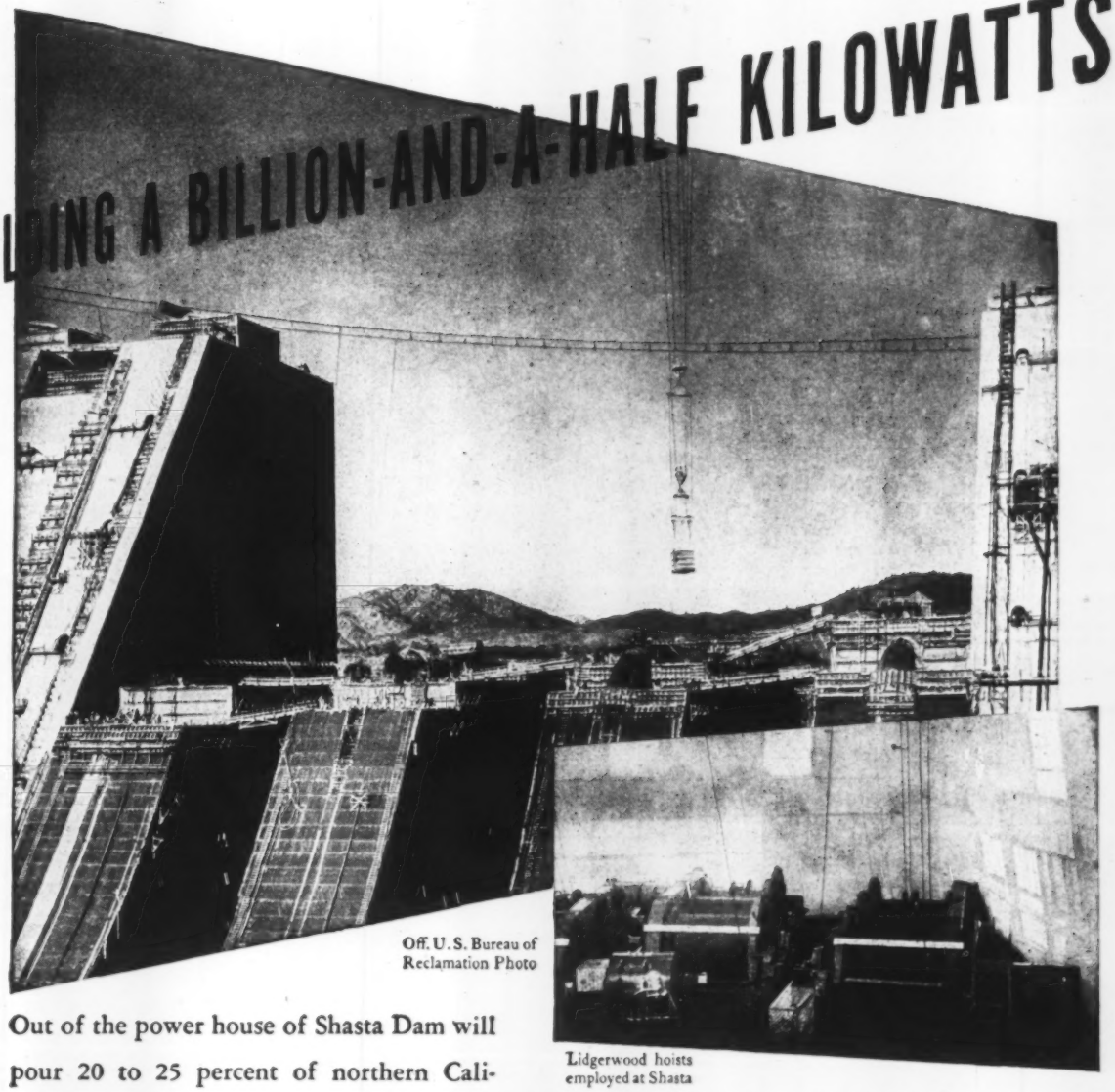

Off. U. S. Bureau of Reclamation Photo

Lidgerwood hoists employed at Shasta

Out of the power house of Shasta Dam will pour 20 to 25 percent of northern California's total power—over a billion and a half kilowatt-hours annually. That takes quite a dam—and over 6,000,000 cubic yards of concrete to build!

It takes some engineering ingenuity, as well, when a structure of that size is to be built at the bottom of a canyon several hundred feet deep. *That* problem was solved by the use of high speed Lidgerwood cableways, seven of them. The traveling cableways, radiating from one head tower, covered the entire working area without requiring the construction of trackways or roads — moving the vast amount of materials in special 8 cubic yard bottom dump buckets, which discharged by remote control. As in the construction of Boulder, Parker, Bonneville and other great dams, Lidgerwood cableways proved an exceptionally fast and efficient method.

ARMY (E) NAVY

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Manufacturing Company

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. . . BUT COMMERCIAL TUNNEL LINER PLATE REMAINS UNDAMAGED!

Here COMMERCIAL Liner Plates, serving as temporary roof supports in a rock tunnel, withstand the terrific impact created by blasting in confined space without damage or danger. Note that the only damage was a small dent in one of the liner plates (circle). This visible proof of COMMERCIAL Liner Plates safe, dependable service under the most adverse conditions is your assurance of their utility. Write today for COMMERCIAL'S booklet on tunnel construction and methods. It contains many such examples of the effectiveness of COMMERCIAL Liner Plates.

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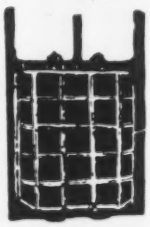

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● Powerful Unit Isuzu mounted on a husky 3 axle under carriage supplies maximum lifting ability. Features include: Hydraulic Steering • Air Brakes • Disc Clutches • Enclosed Cast Gear Case . . . Easy one man operation.

UNIVERSAL UNIT MACHINERY CORP. Milwaukee 14 Wis.

The Choice of Buckets—The problem of selecting the proper bucket to meet the operating requirements where single drum hoists and hook-on applications are involved is simplified by a new 48-page catalog. It amply classifies the different types and their uses, as follows: How to select; typical method of installation; table of sizes; and typical illustrations.—*Blaw-Knox Division of Blaw-Knox Co., P. O. Box No. 1198, Pittsburgh, Pa.*

Cement Plant Bulletins—Two new bulletins describing portable cement plants have been issued. Written concisely, they summarize operating features, and the uses of each type of plant, together with general specifications.

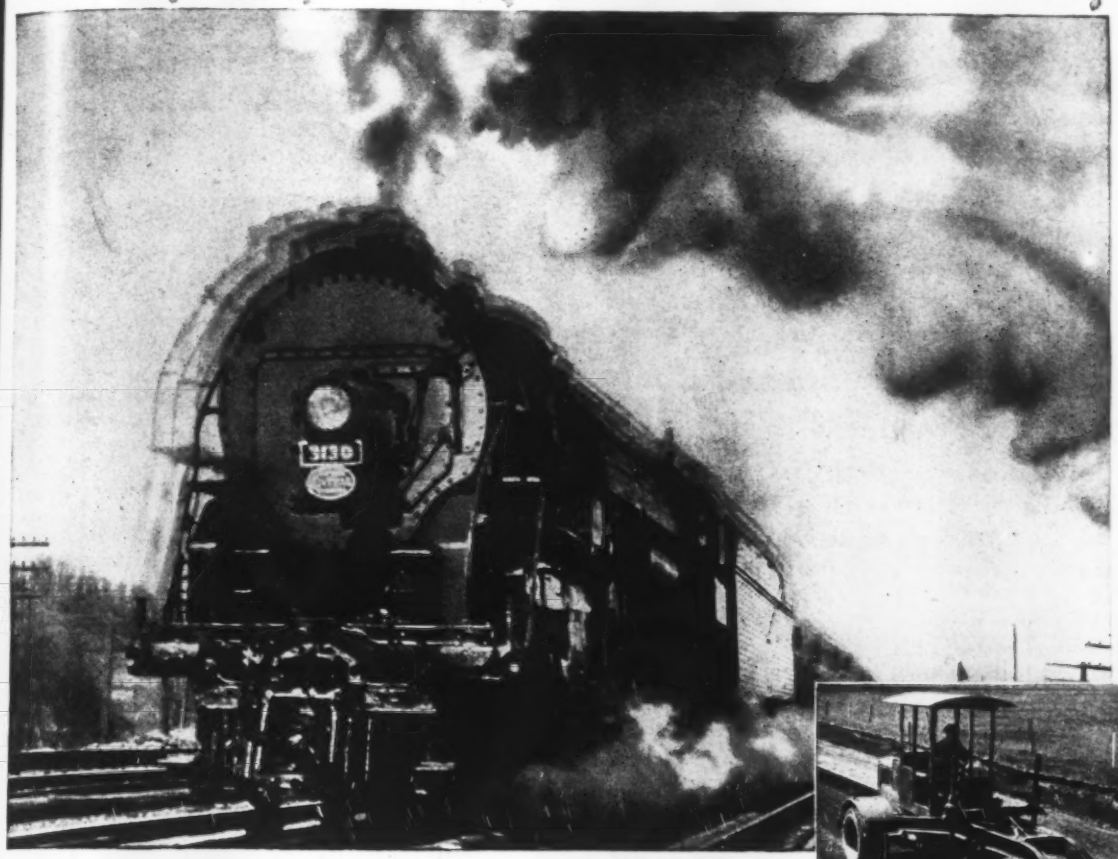
Copies of these are available on request to contractors, dealers, and ready mixed concrete producers.—*C. S. Johnson Co., Champaign, Ill.*

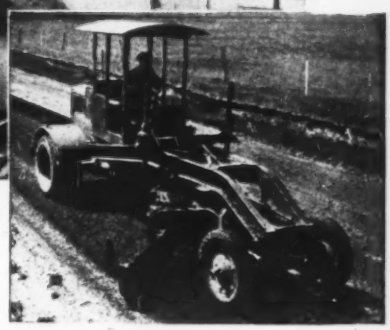
Self-locking Nuts—A new catalog and data book on self-locking nuts, practically an engineering handbook, is available to users of fastenings. The book covers the hex, anchor, and clinch types of nuts, and contains a wealth of material that every design engineer will appreciate, because it puts in easy-to-find form all of the data necessary for the intelligent planning of vibration-proof connections.—*Elastic Stop Nut Corp. of America, Union, N. J.*

Centralized Lubrication—How centralized lubrication systems increase the output of machinery and make savings in time, power and lubricating materials, is the theme of this 16-page bulletin. Printed in three colors, it is a graphic portrayal of the theory and practice of mechanical lubrication.—*The Farval Corp., Cleveland, Ohio.*

Steel Grating and Stair Treads—Illustrated with photographs of the products in actual use, this booklet adds to detailed construction particulars, drawings and tabular specifications, providing full installation data. Subjects covered are the uses of riveted and welded types of grating for open steel floorings, stairways, stair treads, fire escapes, loading platforms, decks for bridges and ships, automobile wash

Making strong the things that make America strong





Increasing Draw-Bar Pull . . . Giving a Grader More Push

A WAR-WORKING locomotive . . . hauling heavier loads at faster speeds . . . begrudging every minute required for repairs . . . needs bolts and nuts so strong they defy the shock and stress of pulls and bumps and banging vibration.

A grader . . . with no tracks to ride . . . takes even a greater beating. Its fasteners need true threads of tough metal so they'll neither relax their grip nor fail under tension.

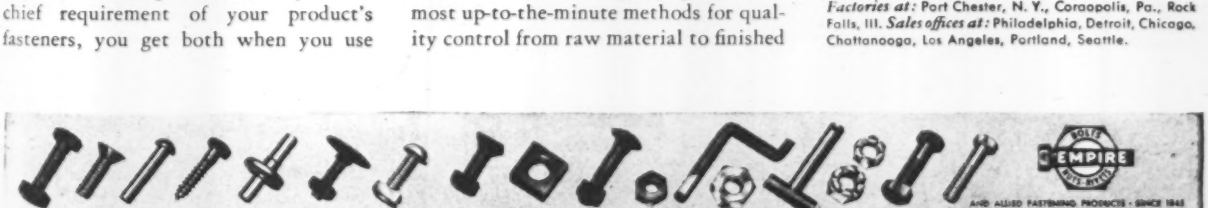
Whether strength or accuracy is the chief requirement of your product's fasteners, you get both when you use RB&W EMPIRE products. For, the same manufacturing steps that make them strong build accuracy into their dimensions.

For 99 years, constantly improved strength, accuracy and finish of RB&W products have resulted from continuous research and progress. Starting with RB&W's development of the first automatic cold-header, this progress has been sustained by great investments in the most modern manufacturing equipment and most up-to-the-minute methods for quality control from raw material to finished fasteners in the three RB&W factories.

For proof of this maximum combination of strength, accuracy and finish you need only look at the famous names in farm implements, automobiles, railroads, aircraft, power and transmission equipment, construction and general industry that have standardized on RB&W fasteners.

RB&W

Russell, Burdsall & Ward Bolt and Nut Company. *Factories at:* Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill. *Sales offices at:* Philadelphia, Detroit, Chicago, Chattanooga, Los Angeles, Portland, Seattle.



RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

racks, drains, catwalks, tow[illegible]tairs, boiler and engine rooms, s[illegible]walks, partitions—in all nearly fifty [illegible]stinct services.—*Wm. F. Klemp Co., [illegible] So. Melvina Ave., Chicago 38, Ill.*

Lumbermen's Directory—A [illegible]mber-ship directory for the West Co[illegible] Lum-bermen's Association, revised [illegible] June 1, 1944, has just been issued. [illegible] lists the various sawmills, loggers, w[illegible]-pipe manufacturers, wood-treating a[illegible] tim-ber-fabricating companies, show[illegible]g lo-cation of plants, principal equ[illegible]ment, species and items produced by [illegible]h.—*West Coast Lumbermen's Asso[illegible]tion, 364 Stuart Building, Seattle, W[illegible].*

High Speed Sawing Machine—A new high speed friction cutting mach[illegible]e is now described and illustrated in a 4 page bulletin.

This bulletin gives specifications and the high operating speeds of these new machines showing their wide applica-tion in the shaping and fabricating of such materials as light alloys, plas-tics, wood, rubber and sheet metal.—*Continental Machines, Inc., 1301 Wash-ington Ave., South, Minneapolis 4, Minn.*

Wire Rope Shears—The third edition of a bulletin describing improved fea-tures of hydraulic and hand shears for cutting commercial grade wire rope, flat bars, round bars and varying shapes and metals has just been published. The shears described and illustrated are of two types, hand and hydraulic. The hand shear is stated to produce clean, fast cutting with power and ease. The weight of the shear body is distributed so as to get the perfect balance needed for giving maximum cutting strength with minimum manual effort.

The hydraulic shear is made for ser-vice requiring greater strength and capacity than can be obtained from a hand shear. It is rugged, powerful and cuts with speed and accuracy. It is supplied for bench mounting but may be had for mounting on a small porta-ble truck.—*Watson-Stillman Co., Ro-selle, N. J.*

Turbine Flow Rate Measurement—Operation of W-K principle in combina-tion with Simplex MO Meter is clearly described and illustrated in a booklet. The MO meter accurately indicates, records and totalizes flow rate meas-urement of differential taps in water tur-bines. Taps are placed on turbine in-stallations already operating, as well as within new constructions. Design and engineering service is offered by the company—*Simplex Valve & Meter Co., 6800 Upland St., Philadelphia 42, Pa.*

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Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.
THE HAYWARD CO., 48-50 Church St., N. Y.

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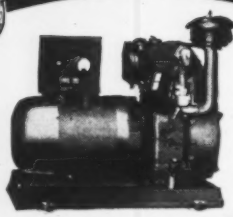

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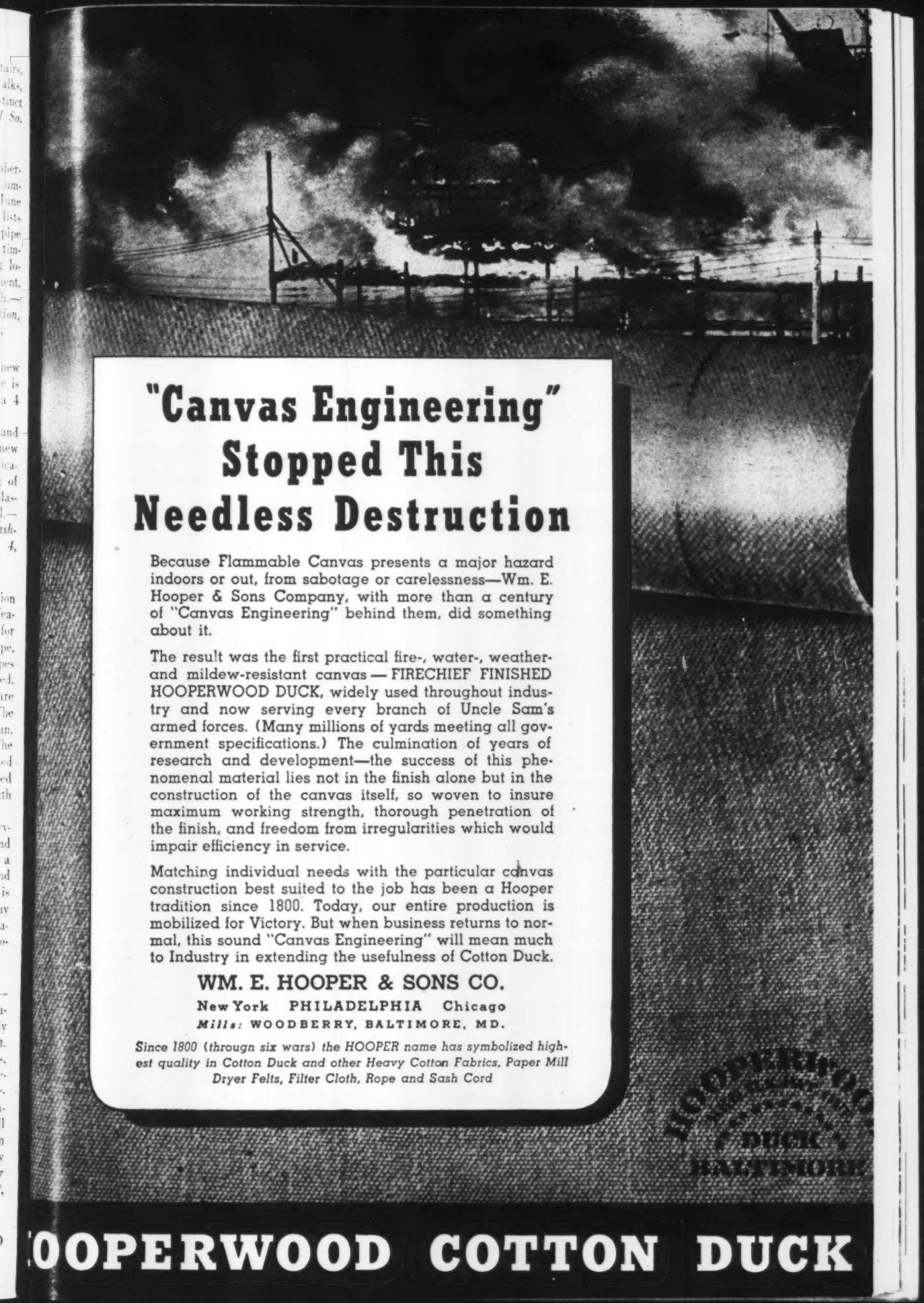

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The result was the first practical fire-, water-, weather- and mildew-resistant canvas — FIRECHIEF FINISHED HOOPERWOOD DUCK, widely used throughout industry and now serving every branch of Uncle Sam's armed forces. (Many millions of yards meeting all government specifications.) The culmination of years of research and development—the success of this phenomenal material lies not in the finish alone but in the construction of the canvas itself, so woven to insure maximum working strength, thorough penetration of the finish, and freedom from irregularities which would impair efficiency in service.

Matching individual needs with the particular canvas construction best suited to the job has been a Hooper tradition since 1800. Today, our entire production is mobilized for Victory. But when business returns to normal, this sound "Canvas Engineering" will mean much to Industry in extending the usefulness of Cotton Duck.

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Since 1800 (through six wars) the HOOPER name has symbolized highest quality in Cotton Duck and other Heavy Cotton Fabrics, Paper Mill Dryer Felts, Filter Cloth, Rope and Sash Cord

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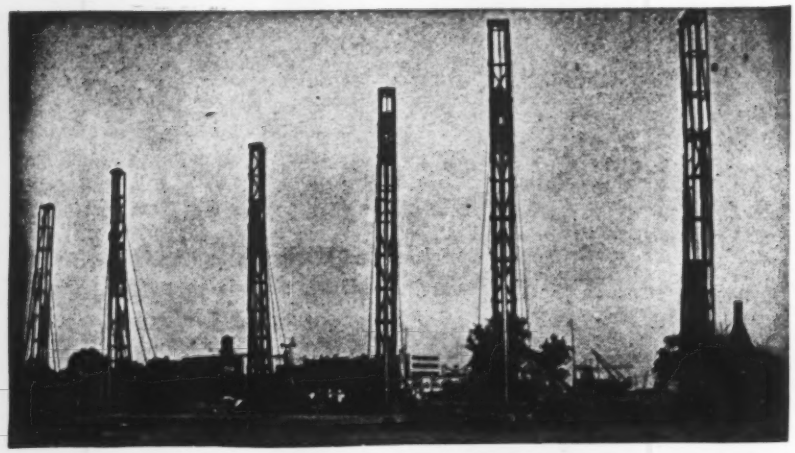
OOPERWOOD COTTON DUCK



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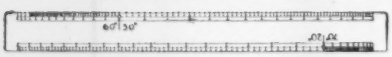

It eliminates all the fuss of laying-out and locating plans, picture-planes, vanishing points, measuring points, viewing angles, etc.

It is made of fine laminated plastic and accurately die printed on both faces.

An hour's practice with this scale in accordance with the simple, clear, and concise instructions provided with each scale, will very materially increase your perspective drawing speed. Draftsmen say it cuts their perspective drawing time 25 to 50 percent.

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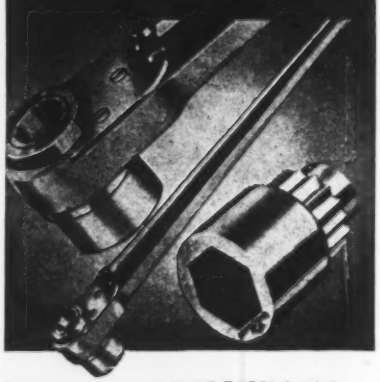

ARMSTRONG
DROP FORGED CONSTRUCTION RATCHETS

The ARMSTRONG Reversible Ratchet Construction Wrenches are made of steel thruout—the Ratchets are drop forged, the Nut Socket machined from special analysis bar steel. All parts except the handle are hardened. The spindle of the Ratchet is of "wide open" design—permits bolt to pass thru the Ratchet so that nuts can be run any distance along bolt and securely set with one setting. 24" or 36" Ratchets take square or hexagonal sockets for nuts of from 1" to 2⅝" dia. or 1⅛" to 3⅛" dia., respectively.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
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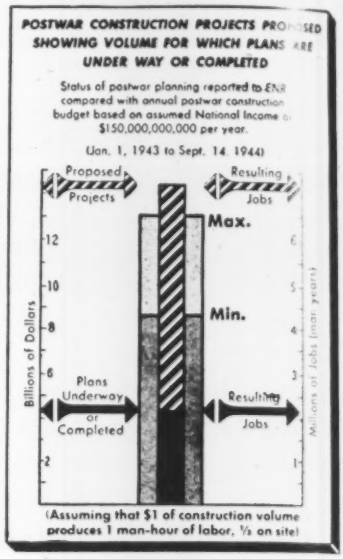
POSTWAR PROJECTS


POSTWAR CONSTRUCTION PROJECTS PROPOSED
SHOWING VOLUME FOR WHICH PLANS ARE
UNDER WAY OR COMPLETED
Status of postwar planning reported to ENR compared with annual postwar construction budget based on assumed National Income of $150,000,000,000 per year.
(Jan. 1, 1943 to Sept. 14 1944)
Proposed Projects
Resulting Jobs
Max.
Min.
Billions of Dollars
Millions of Jobs (man years)
Plans Underway or Completed
Resulting Jobs
(Assuming that $1 of construction volume produces 1 man-hour of labor, ⅓ on site)

Projects proposed for postwar construction have been published in these columns since January, 1943 as they have been reported to ENGINEERING NEWS RECORD.

Statistics based on these reports are used by the Committee on Postwar Construction of the American Society of Civil Engineers to measure the progress of plans for postwar projects.

The chart above shows, both in estimated dollar volume and in jobs or man-years of labor, how fast this reservoir of future work is filling up.

WATER SUPPLY

PROPOSED WORK

Ark., Little Rock—North Little Rock Water Co., 117 E. 3 St., exten. watermains in Clover area. Over **$15,000.**

Calif., Arcata—City, water sys. development, **$262,430.**

Calif., Davis—City, water sys. exten. **$25,000.**

Calif., Eureka—City, completion municipal water sys. with treatment plant and storage water reservoir. **$265,000.**

Calif., Fortuna—City, water sys. exten. Not to exceed **$30,000.**

Calif., Fresno — City, water distribution **$200,000.**

Calif., Pittsburg—City, filter plant. **$18,000.**
Calif., Yreka—City, imprv. water sys. **$28,000.**

Ind., Michigan City — Bd. Waterworks Trustees, C. Sweeney, pres., 532 Franklin St., imprv. WW, new pumps, elevated water tower, pump. station addn. **$141,000.** H. Draves, supt. WW.

★**Mich., Detroit**—Dpt. Water Supply, 735 Randolph St., 54, 48 and 36 in. watermain exten., in 8 Mile Road-Telegraph to Livernois to Bennett, **$1,910,000;** 54 in. watermain exten. in W. Chicago, **$1,080,000;** 48 and 36 in. main exten. in Evergreen Rd., **$1,395,000.** L. G. Lenhardt, 735 Randolph St., supt.-genl. mgr.

Mo., Boonville—City, electrifying water plant, **$15,000.**

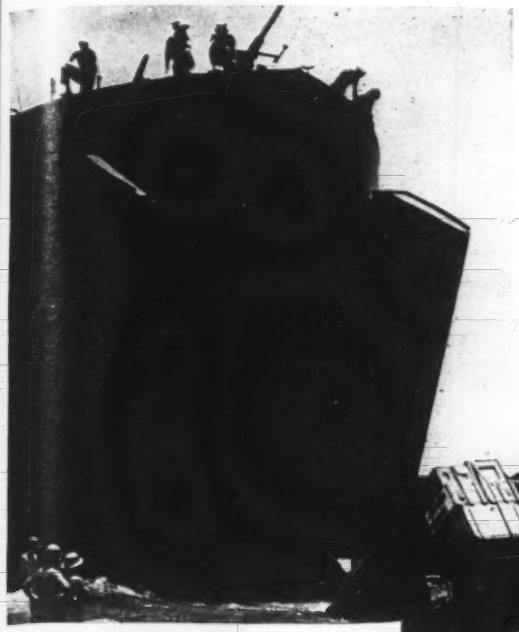
R. I., East Providence—Town Water Dpt., relaying about 5,280 lin. ft. 16 in. watermain, installing new 250 h.p. generator in pump station. Over **$25,000.** Financing not yet provided for.

Tex., Kilgore—City, WW sys. imprvs. **$50,000.**

Ont., Goderich—Public Utilities Comm., S. H. Blake, town clk., overhauling entire water sys., relaying many existing mains with large pipe. About **$100,000.**

PLANS UNDERWAY

Ind., Alexandria—City Council, H. E. De-Moss, City Hall, WW imprvs., deep well, electric deep well pump, expan. WW sys. Jno. W. Moore & Son, 720 Indiana Pythian Bldg., Indianapolis, consult. engr.



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POSTWAR PROJECTS (Cont'd.)

Ind., Tell City—City Council, W. Werner, mayor and chn., and Nicholas Beumel, clk., 400,000 gal. water storage tank and new distr. sys. pumps. M. L. Burden, Cannelton, consult. engr.

Kan., Larned—City, F. L. Frizell, mayor, water softening plant. **$175,000.** Black & Veatch, 1706 Bway., Kansas City, Mo., consult. engrs. CD 11/5—ENR 11/11.

Kan., Phillipsburg—City, J. Groom, mayor, WW imprvs. **$125,000.** Wilson & Co., P. O. Box 815, Salina, consult. engrs.

Kan., Pittsburg—City, W. O. Myers, mayor, City Hall, WW imprvs. **$50,000.** Black & Veatch, 1706 Bway., Kansas City, Mo., consult engrs.

Kan., Russell—City, H. D. O'Brien, mayor, WW imprvs. **$20,000.** Wilson & Co., Public Utility Bldg., Salina, consult. engrs.

★**Mich., Detroit**—Wayne Co. Road Comn., 3800 Barium Tower, 11 mi. 24 in. watermain in Eureka Rd. from Fort Road west serving Romulus and Taylor Twps., etc. $1,200,000; 12 mi. 24 in. watermain in Schoolcraft Rd. serving Redford and Livonia Twps., and serving as Schoolcraft Rd. feeders making supply available to Plymouth and Northville, Wayne Co. Training School, Detroit House of Correction and Maybury Sanitarium. **$1,200,000.** L. G. Smith, engr.

Neb., Fairbury—City, WW reservoir. **$75,000.** C. E. Bell, Fairbury, supt. and engr.

Tenn., Murfreesboro—City, c/o S. Cox, mgr., plans 35% completed constructing waterline from Walter Hill Dam to city, and imprv. WW. **$280,000.** Roberts & Co., Third National Bank Bldg., Nashville, consult. engrs.

★**†Tex., Fort Worth**—S. H. Bothwell, city mgr., City Hall, 5 year expansion plan for WW Dpt., for 1944-1945 engineering report and study **$14,000,** Lake Worth Inlet enlargement **$40,000,** new motor equip. **$12,000,** Holly Plant outlet enlargement **$40,000,** new c.i. mains and exten. **$100,000,** one 15 m.g.d. pump and motor **$45,000,** painting steel tanks **$10,000,** cleaning main (dual) **$10,000,** purchasing private sys. **$200,000,** for 1945-1946 leakage survey **$10,000,** elevated steel storage **$150,000,** enlargement 3 booster stations **$125,000,** new North Side Booster Station **$75,000,** new motor equip. **$20,000,** remodeling Holly Plant **$90,000,** new 4 m.g.d. clear well **$200,000,** new c.i. mains **$200,000,** for 1946-1947 new 20 m.g.d. filter **$180,000,** new motor equip. **$15,000,** new sedimentation basin **$150,000,** new c.i. mains **$300,000,** new equipment booster stations **$8,000,** new meter shop **$25,000,** for 1947-1948 new warehouse **$50,000,** new motor equip. **$20,000,** chemical house and mixing basin enlargement **$125,000,** Holly Plant drives and ground imprv. **$35,000,** garage **$45,000,** c.i. mains **$100,000,** new equipment booster stations **$15,000,** for 1948-1949 new 15 m.g.d. pumps and motors (2) **$90,000,** new c.i. mains **$100,000,** new motor equip. **$10,000,** new conduit from Lake (2 years) **$700,000,** for 1949-1950 new conduit from Lake **$800,000.** Freese & Nichols, 407 Capps Bldg., consult. engrs. CD 5/5—ENR 5/18.

Tex., San Antonio—City, c/o Water Bd., 106 W. Market St., plans 10% completed imprv. Market St. water supply station, **$25,000;** new water supply well, Ave. B and S. St., **$30,000;** plans 5% completed laying 4- to 6-in. c.i. feeder lines from Ave. B and S St. water supply well, **$45,000.**

Tex., San Antonio—City, c/o Water Bd., 106 W. Market St., installing 10 in. c.i. feeder lines supplying elevated steel tank, off Highland Park, southeast section, **$40,000;** 4- to 6-in. feeder lines radiating from new supply well in northwest Woodlawn section, **$25,000;** developing new water supply (artesian well) off Harlandale in southwest, **$25,000;** laying new feeder lines from artesian supply well off Harlandale, southwest section, **$25,000;** developing artesian water supply well, northwest Woodlawn section, **$25,000.** Engineer c/o Engineering Staff of Bd.

Man., St. Boniface—Municipality, replacing 8 mi. 4 in. watermains and reconnecting dead ends **$105,978;** constructing watermains in Archibald St. from Swift plant to Elizabeth Rd., **$15,000;** elevated water tank, **$75,000.** J. A. Bibeau, City Hall, supt. and engr. CD 1/24—ENR 2/10.

Ont., Alexandria—Municipality, water sys. extens., imprvs. **$50,000.** Pub. Utilities Comn., c/o P. A. Charlobois, Alexandria, engr.

Ont., Parry Sound—Municipality, c/o H. Polkinghorne, secy., installing duplicate supply main from pump station to business section of town. **$50,000.** Pub. Utilities Comn., Parry Sound, engr.

Ont., Peterborough—Municipality, filtration plant exten., new pump. equip., imprv. watermain distr. sys. **$100,000.** Utilities Comn., R. L. Dobbin, mgr., 233 Aylmer St., engr.

Ont., Simcoe—Municipality, installing new unit in pump. station, water softening plant exten. **$50,000.** Pub. Utilities Comn., Simcoe, engr.

Ont., Stratford—Municipality, add'l. equip., renewals at pump. station, distr. sys. **$30,000.** Pub. Utility C[illegible] A. B. Manson, engr.

★**Ont., Timmins**—Municipality, A. [illegible] clk., 43,025 ft. watermain exten., $84,761; water treatment plant, **$250,000;** 4,0[illegible] meters, **$80,000.** J. D. MacLean, T[illegible] Hall, engr.

Que., Hull—City, R. Brunet, ma[illegible] exten. WW sys. $71,300. T. Lan[illegible] owner, engr. CD 2/10/43—ENR 2[illegible]

★**Que., Montreal**—Municipality, c[illegible] J. A. Mongean, city clk., purchasing, [illegible]ing off 2 lakes on Laurentian Mountai[illegible] thus forming reservoir for city's water su[illegible] and laying pipeline from there to city. $25,000,000. Montreal Water Bd., St. Jos[illegible] St. Verdun, engrs.

Que., Quebec City—Municipality, [illegible] filter plant and artesian wells, regula[illegible] at Limoilou pump. station, **$150,000.** E. Hamel, City Hall, city engr.

Sask., Saskatoon — Municipality, [illegible] clear water reservoir, **$200,000,** extending [illegible] mains, **$100,000.** G. D. Archibald, City Hall, [illegible]city engr. CD 1/17—ENR 1/27.

PROJECTS CANCELLED

★**Mich., Detroit**—Dpt. Water Supply, [illegible] Randolph St., cancelled following projects: 54-48 in. watermain, West Chicago-Evergreen, **$2,730,000;,** 54 in. watermain, Eight Mile Rd., Livernois to Meyers Rds., **$300,000;** 48 in. watermain Eight Mile Rd., Meyers to Greenfield Rds., **$350,000;** 36 in. watermain, Eight Mile Rd., Greenfield Rd. to Telegraph to Bennett, **$963,000;** 24 in. watermain Fourth St. Fort to Cherry St., **$75,000;** 16 in. watermain Eight Mile Rd., **$31,000.** CD 7/12—ENR 7/27.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., Arcata—City, sewage disposal sys. **$100,000.**

Calif. Davis—City, sewerage plant, **$100,000;** storm drainage facilities, **$10,000.**

★**Calif., Fresno** — City, sewage disposal sewers, **$980,000;** storm water control, **$191,000.**

Calif., Redding—City, sewage disposal sys. **$150,000.**

Kan., Atchison—D. Van Ness, city mgr., City Hall, sewers. **$48,177.**

★**Mich., Detroit**—Wayne Co. Drain Comm., 3505 Barium Tower, Ecorse Drain 2, Allen Rd. to Inkster Rd. Sanitary Trunk Sewer, sanitary interceptor, trunk sewer serving south portion Dearborn and Nankin Twps., part of Allen Park village and northeast part Romulus Twp., incl. Wayne Co. Airport, **$1,525,000.** Geo. A. Dingman, drain comr.

Mich., Eloise—Wayne Co. Infirmary, Eloise, 1 story incinerator plant with drainage, **$30,000;** sewer, watermain and power service extens., **$250,000.**

Tex., Kilgore—City, sewers. **$75,000.**

Wash., Monroe—City, City Hall, sewage disposal plant. **$25,000.**

Ont., Hamilton — Municipality, sewer in Wentworth St. from Fennel to Queenedale Aves. **$154,000.**

Ont., Port Hope — Municipality, sewage treatment plant. **$40,000.**

Ont., Rainy River—Municipality, sewage treatment plant. **$40,000.**

Ont., Wallaceburg — Municipality, sewage treatment plant. **$50,000.**

Ont., Windsor—Municipality, sewage treatment plant. **$50,000.**

PLANS UNDERWAY

★**Ill., Decatur** — City, City and County Bldg., plans 50% completed Edward St. relief sewers, **$135,000;** plans 25% completed Terrace Garden relief sewers, **$22,000;** preliminary plans underway Northwest relief sewers, **$35,000;** plans Northeast relief sewers, **$750,000;** preliminary sketches Prairie St. Dist. relief sewers, **$200,000;** Prairie St. sewer rehabilitation **$65,000;** plans 7th Ward sewer rehabilitation, **$60,000.** Warren & Van Praag, Standard Office Bldg., consult. engrs. CD 10/8—ENR 10/21.

★**Ill., Mt. Vernon**—City, City Hall, plans completed storm and sanitary sewerage sys., new plant either at present plant location or ½ mi. further east. **$650,000.** Financing not yet provided for. Hurst-Rochelle, Hillsboro, engrs.

Ill., Murphysboro—City, preliminary plans underway sewage disposal plant on Big Muddy River. **$200,000.** E. A. Fulton, 3 S. Mermac St., St. Louis, Mo., consult. engr.

Kan., Eldorado—City, H. E. McMillen, mgr., sanitary sewer. **$67,000.** R. A. Shook, city engr.

Mass., Greenfield—Town, E. L. Bond, supt. Dpt. Streets & Engineering, Town Hall, plans completed sewage and drainage exten. **$75,881.** Financing not yet provided for.

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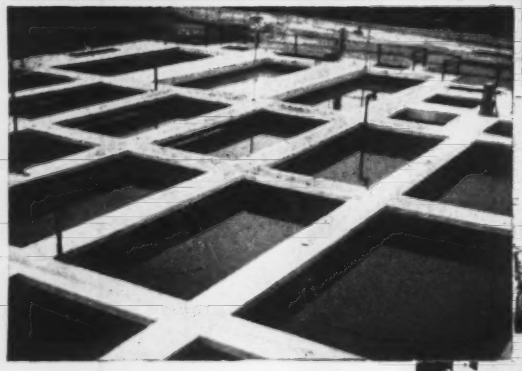

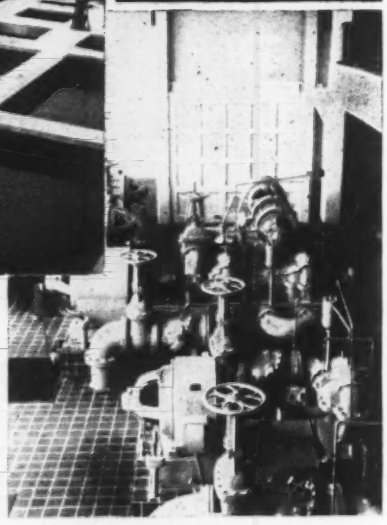

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POSTWAR PROJECTS (Cont'd.)

★**Mich., Detroit**—City Dpt. P. W. Hall, preliminary plans underway Relief Sewer, new outlet into Detroit or Rouge River and exten. into sections new existing Lonyo area Lonyo and Hubbell areas, **$9,600,000** R. Thompson, City Hall, city engr.

★**Mich., Detroit**—Dpt. P. Wks., C. plans underway Northwest Distr. Relief Sewers, incl. Part I, Southfield Storm Outlet—outlet for storm s. Southfield and Hubbell Dists., $4. Part II, Schoolcraft Arm, west River and extending east to Hubb. **$2,800,000**; Part III, addnl. arms s. Schoolcraft arm meeting requi. **$9,200,000**; Part IV, dredging Rouge R. enlarge storm flow capacity, **$1,000,000** Thompson, city engr.

Mich., River Rouge—City, plans u. sewage pumping station, new pump. **$80,000**; garbage incinerator, **$50,000**. L. Brown & Sons, 120 Madison Ave., consult. engrs.

Neb., Hastings—City, E. I. Dier, cl. Hall, exten., imprv. sewage plant. $ P. T. Naylor, city engr.

N. Y., Bellerose—President Queens M. A. FitzGerald, comr. Boro Wks., Queens Blvd., Kew Gardens, Zone 15, underway sanitary sewer 256 St. fr. Ave., southern location to 87 Ave., location, etc., (PQS-44), **$113,400**. W. H. Bertram, asst. engr. in charge of sew.

N. Y., Elmhurst—President Queens M. A. FitzGerald comr. Boro Wks., Queens Blvd., Kew Gardens, Zone 15, underway combined sewer, 82 Pl. Penelope Ave. to Cowles Court, etc., (PQS-42). **$28,210.** W. H. Bertram, asst. engr. in charge of sewers.

N. Y., Flushing—President Queens M. A. FitzGerald, comr. Boro Wks., Queens Blvd., Kew Gardens, Zone 15, underway combined sewer 153 St. fr. Ave. to Grand Central Parkway, south (PQS-45). **$33,510.** W. H. Bertram, asst. engr. in charge of sewers.

N. Y., Hollis—President Queens Boro M. A. FitzGerald, comr. Boro Wks., Queens Blvd., Kew Gardens, Zone 15, underway storm sewer in Farmers Blvd. Woodhull to Liberty Aves., (PQS-52). **$10,300.** W. H. Bertram, asst. engr. in charge of sewers.

N. Y., Jamaica—President Queens Boro M. A. FitzGerald, comr. Boro Wks., Queens Blvd., Kew Gardens, Zone 15, underway, storm sewer in Jamaica Ave. from Metropolitan Ave. to Sutphin Blvd. (PQS-50), **$200,000**; storm sewer (second barrel) in Liberty Ave., from 150 to Tuckerton Sts., (PQS-53). **$12,900.** W. H. Bertram asst. engr. in charge of sewers.

N. Y., Kew Gardens—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Zone 15, plans underway combined sewer, 132 St. prolonged from Union Turnpike, southside, to 82 St., etc., (PQS-43). **$37,320.** W. H. Bertram, asst. engr. in charge of sewers.

★**N. Y., New York**—President Manhattan Boro, W. D. Binger, comr. Boro Wks., Municipal Bldg., Zone 7, plans completed sewers in Amsterdam Ave. from 72 to 73 Sts., (PM-56), **$300,000**; 8 Ave. from 143 to 147 Sts., (PM-59), **$155,000**; Bway. from 142 to 150 Sts., (PM-60), **$130,000**; Dyckman St. from Payson Ave. to Hudson River (PM-61), **$100,000.** D. G. Edwards, ch. engr.

N. Y., Richmond Hill—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway storm sewer in Jamaica Ave. from 116 St. to Metropolitan Ave. (PQS-49), **$200,000.** W. H. Bertram, asst. engr. in charge of sewers.

N. Y., St. Albans—President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway storm sewer in 177 St. from Sayres to 109 Ave., etc., (PQS-51). **$70,300.** W. H. Bertham, asst. engr. in charge of sewers.

★**N. Y., Woodhaven** — President Queens Boro, M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans completed storm sewers, Jamaica Ave. from Brooklyn Boro Line to 88 St., (PQS-46), **$200,000**; Jamaica Ave. from 88 to 102 Sts., (PQS-47), **$200,000**; Jamaica Ave. from 102 to 116 Sts., (PQS-48), **$200,000.** W. H. Bertram, asst. engr. in charge of sewers.

N. D., Mandan—City, S. E. Arthur, aud., City Hall, surveys storm and sanitary sewers, pre-sedimentation basin at water filtration plant, imprv. water distr. sys., connections, new water reservoir, sewage plant, **$50,000.** Burns & McDonnell, 107 W. Linwood Blvd., Kansas City, Mo., consult. engrs.

★**Wis., West Allis**—City, 7525 W. Greenfield Ave., Z 14, sanitary and storm sewers. **$725,000.** P. Burbach, city engr.

N. B., Lancaster (Postal District Saint John)—Parish of Lancaster, c/o E. Claude Seeley, Lancaster, sewers, **$275,000.** D. R. Smith, City Hall, Saint John, engr.

Ont., Chatham — Municipality, sewage treatment plant, **$50,000** or more. F. M. S. Kingston, City Hall, engr.

Ont., Fort Francis—Municipality, sewage treatment plant, **$40,000.** Geo. Henry, Town Hall, engr.

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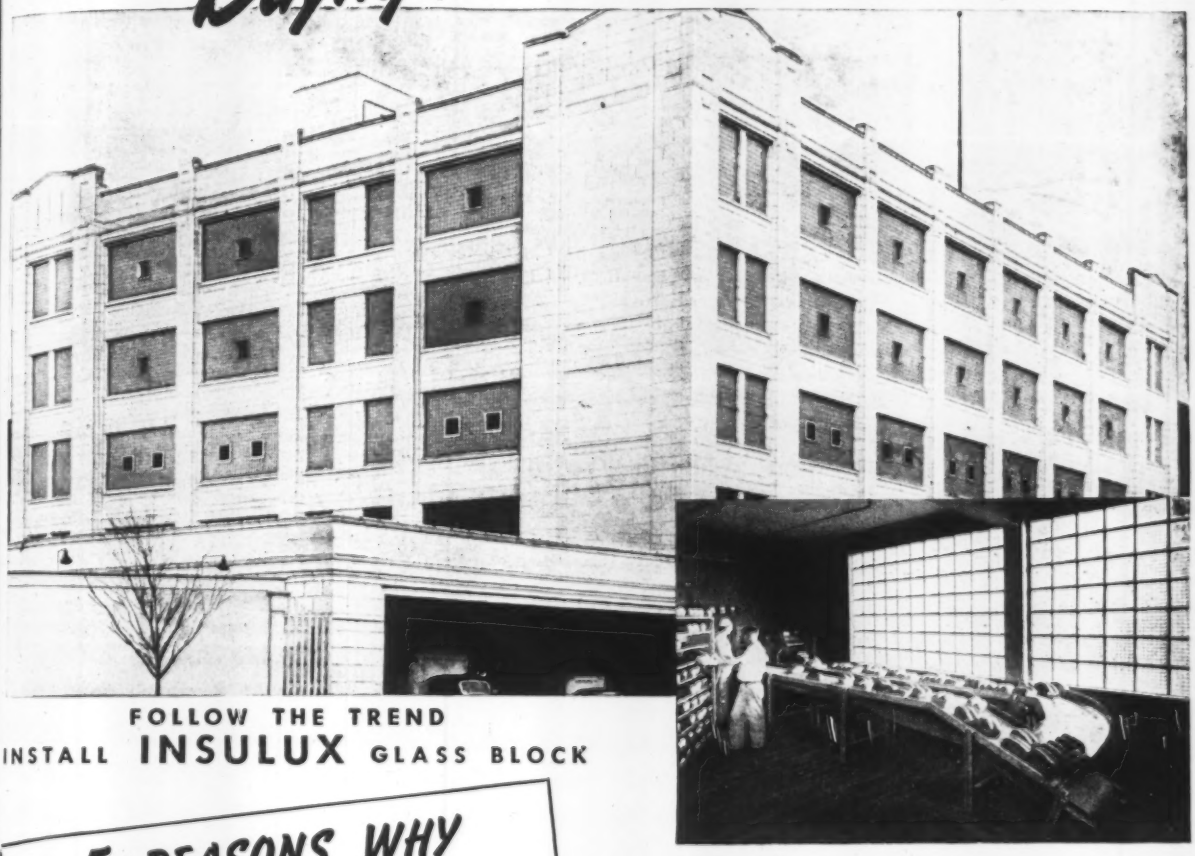

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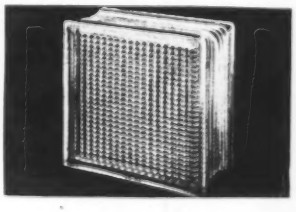

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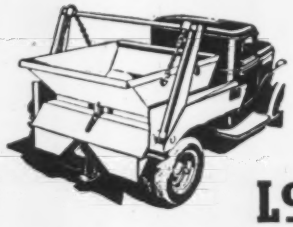

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POSTWAR PROJECTS (Cont'd.)

Ont., London—City, preliminary pl... ten., East End and West End sewa... posal plants and de-watering plant... sludge cake available as fuel, **$200,00**... paring report incinerator, **$100,000.** ... Veitch, city engr. CD 2/28—ENR 3/...

Ont., London—City, enlarging sew... posal plants, about **$75,000;** enlarging... structing new incinerator, about **$65,0**... M. M. Veitch, c/o owner, engr.

Ont., Port Arthur—Municipality, tr... lateral sewers in Brent Park area. **$**... S. E. Flook, City Hall, engr.

Ont., Simcoe—Municipality, concre... tling basin adjacent to main sewage... station, exten. sewer mains with late... nections serving several outlying stre... parts of streets. **$75,000.** Pub. ... Comn., Simcoe, engr.

Ont., Timmins—Municipality, A. L. ... clk., exten. sanitary sewers. **$61,157;** ... ft. storm sewers. **$140,210;** sewage ... plant exten., **$60,000.** J. D. MacLean, ... Hall, engr.

Que., Hull—City, R. Brunet, mayor, ... construction. **$163,000.** T. Lancto... owner, engr.

★**Que., Quebec City**—Municipality, ... from St. John St. to St. Charles ... **$250,000;** underground canalization of ... River, St. Michael stream, **$250,000.** E. Hamel, City Hall, city engr.

Que., Quebec City—Municipality, cons... ing main pump. station St. Andrew St. ... deep water outfall sewer, collector ... and syphon across River. **$100,000.** E. Hamel, City Hall, city engr.

Sask., Saskatoon — Municipality, ... sewers, **$200,000;** storm sewers, **$200,000.** G. D. Archibald, City Hall, city engr. CD 1/17—ENR 1/27.

BRIDGES

PROPOSED WORK

Calif., Davis—City, underpass, **$100,000.**

★**Calif., Fresno**—City, bridges, underpasses, **$505,000.**

Calif., Woodland—Yolo Co., Woodland, bridge over Sacramento River at Elkton, **$250,000.**

New York—State Dpt. P. Wks., Albany. Zone 1, steel, concrete ny. bridge over Moon Brook on Route 60, 2 mi. north Jamestown, Chautauqua Co., replacing temporary span erected following washout by flood in 1943, **$25,000.**

N. S., Halifax—Municipality, bridge exten. from St. John's cemetery over Canadian Natl. R. R. tracks and beyond Fairview railway station, **$250,000.**

Ont., Hamilton — Municipality, overhead bridge at Kennilworth Ave. and Ottawa St. **$300,000.**

PLANS UNDERWAY

Ind., Anderson—City of Anderson and Madison Co., Anderson, 2 concrete bridges over White River on bypasses around city on east and west sides at city limits, one on Raible Ave., extended at western limits of city and other on Scatterfield Rd. extended at eastern limits, **$100,000;** C. V. Anderson, co. engr.; widening with 20 tracks present underpass at Marine Dr. under New York Central R. R. yards, new underpasses under Pennsylvania and New York Central R. R. tracks at each side of city and new underpasses under New York Central R. R. tracks southeast of city on west side bypass, **$50,000,** V. Lee, city engr., and C. V. Windsor, Anderson, co. engr.

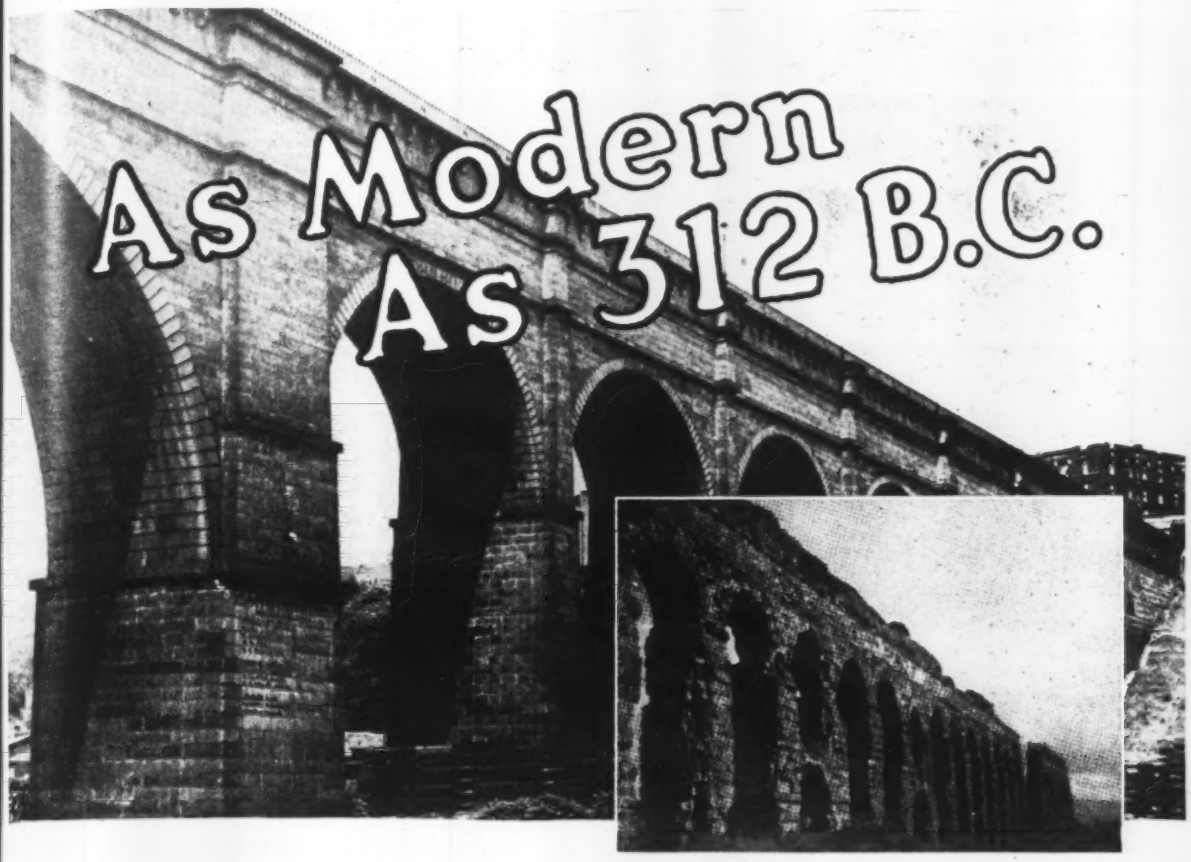
Ind., Hobart—Bd. Comrs. Lake Co., E. H. Swartz, aud., Court House, Crown Point, bridge over Deep River, **$35,000.** Wm. J. Schroeter, Court House, Crown Point, engr.

Ind., Richmond—Wayne Co., Court House, 4 and Main Sts., replacing worn out bridge over Whitewater River, **$130,000.** G. Gault, co. engr.

Kan., Wellington—Sumner Co., 3 steel plate girder and 10 rein.-con. bridges. **$40,000.** R. C. Kirk, Wellington, co. engr.

Mich., Detroit—Wayne Co., Road Comn., 3800 Barlum Tower, plans underway highway grade separation and concrete, steel bridge at intersection of Hines Dr. and Ann Arbor Rd. **$75,000.** L. C. Smith, Co. Road Comn., engr.

Missouri—State Hy. Comn., Jefferson City, plans 90% completed two 10 ft. rein.-con. slab span, culvert type bridges over Southwest fork of Boone Creek, Route 66, Proj. FA 248 D(2), **$18,000;** two 12 ft. concrete slab span, culvert type bridge over Little Bourveise River, road from Cuba to Bourbon, Route 66, Proj. FA 248 B(2), **$9,100,** both Crawford Co.; two 12 ft. rein.-con. slab span culvert type bridge over Keever Branch state road from Jasper East, Route SK Proj. FAS 394 B(2), Jasper Co., **$5,000;** two 12 ft. rein.-con. slab span culvert type bridge over Windsell Curb Road from Sullivan to St. Clair, Route 66, Proj. FA 258 A(2), **$18,000;** one 35 ft. and two 25 ft. I-Beam span, dual structures steel pile bents to rock over Windsell Creek, Route 66, Proj. FAS 258 A(2), **$38,000,** both Franklin Co. C. W. Brown, ch. engr.



THIS huge pile of masonry is part of the Old Croton Aqueduct, delivering daily twenty-four million gallons of water to New York City. Old Croton is solid brickwork, concrete, and cast iron, 41 miles long, completed in 1848 after 11 years of work at a cost of $11,500,000.

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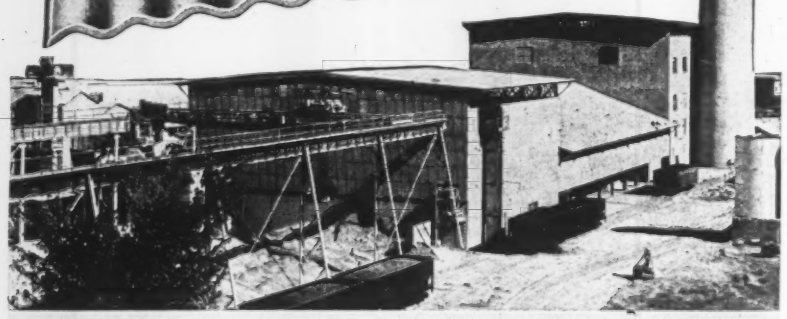

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POSTWAR PROJECTS (Cont'd.)

Missouri—State Hy. Comn., Jeff ... plans 90% completed, raising, ... structure consisting two 45 ft. a... ft. concrete deck girder spans ... bents on creosoted piling and a... 20 ft. concrete slab spans on conc... on concrete piling over Middle ... Chariton River, Route 24, from ... to Moberly, Proj. FA 795-F(2); ... 20 ft. concrete slab spans, concrete ... creosoted timber piling and addi... ft. slab spans, concrete bents on ... timber piling over overflow of Mi... of Chariton River, Chariton Co.

N. Y., Falconer—Chautauqua Co. ... 454 N. Work St., repairs, recon... imprvs. various county-owned hy... **$75,000-$150,000.** B. Chilson, co. ...

★**N. Y., New York**—President M... Boro, W. D. Binger, comr. B... Municipal Bldg., Zone 7, plans ... East River Dr. viaduct from E. ... 23 Sts. (PM-46), **$1,980,000**; Rive... Viaduct, 153 to 155 Sts. (PM-40)... D. G. Edwards, ch. engr. CD 1/... 1/28.

N. Y., New York—President M... Boro, W. D. Binger, comr. Bo... Municipal Bldg., Zone 7, plans ... grade separation at St. Nicholas ... 155 St., (PMS-175) **$200,000.** State A... ning Funds allotted. D. G. Edwa... engr.

★**O., Cleveland**—City, S. F. Da... Pub. Serv., City Hall, plans underway Abbey St. Bridge between W. 14 St. and ... Ave., **$1,350,000**; Detroit Ave. bridge over N. Y. C. and St. L. R. R., **$367,000**; E. 34 St. Bridge over Kingsbury Run, **$1,...,000**; E. 55 St., bridge over W. & L. E. R. R., **$630,000**; Main Ave. Bridge over Cuyahoga River, **$850,000**; new Central Viaduct, **$3,064,800**; Fulton Rd. Bridge over C. C. C. & St. L. R. R., **$528,000**; E. 152 St. ... over N. Y. C. R. R., **$270,000**; repairing Center St. Bridge over Cuyahoga River, **$150,000**; Jefferson Ave. Bridge, **$100,000**; Willow St. bridge over Cuyahoga River, **$100,000**. Financing not yet provided for. J. M. Heffelfinger, 518 City Hall, engr. CD 3/1/43 and 12/10/43—ENR 3/4/43 and 12/30/43.

★**O., Cleveland**—City, S. F. David, dir. Pub. Service, City Hall, plans 5... completed bridge carrying highway over ... Creek in Brookside Park, **$32,000**; ... under B. & O. R. R. at West Blvd. ... **$175,000**; grade separations at E. 26 St. and Pennsylvania R. R., **$772,000**; at E. 26 St. and N. Y. C. R. R., **$740,000**; at E. 26 St. and Lakefront Highway, **$561,000**; ... obstacles to be overcome and financing not yet provided for; plans repairing East Ave. Bridge over Cuyahoga River, **$55,000**; widening E. 55 St. under N. Y. C. ... **$110,000**; grade separation E. 75 St. and W. & L. E., **$415,200**; E. 55 St. and Lakefront highway separation, **$796,000**; E. 79 St. bridge exten. under Erie R. R., **$451,000**; financing not yet provided for. J. M. Heffelfinger, 518 City Hall, bridge engr. CD 12/10—ENR 12/16.

★**Pennsylvania**—State Hy. Dpt., Harrisburg, highway grade separation proj. interchange north of proposed Georgetown-Glasgow bridge, north approach to proposed bridge necessitating interchange with Route 68, **$97,200**; interchange at intersection Routes 30 and 168, relocation approach of 168 to proposed Georgetown-Glasgow bridge and imprv. U.S. Route 30, **$102,600**; interchange at intersection Routes 18 and ... maintaining Route 30 a freeway with other major hy. grade separation, **$102,600**; interchange at north end proposed Midland-Shippingport Bridge, constructing proposed bridge will demand definite interchange structure at north end of bridge with Route 68 eliminating certain traffic flow problems, **$86,400**; east and west end proposed Fallston Bridge, east end of bridge interchange eliminating cross-traffic on proposed Ohio River Blvd. west end interchange connecting with Route 51, **$324,000**; hy. grade separation to Brady's Park for eliminating cross-traffic at Route 51, **$86,400**; interchange at intersection Routes 51 and 168, relocation Route 51 and imprv. Route 168 with contemplated increase of traffic on 51 will demand traffic separation at intersection south of Darlington Borough, **$86,400**, all Beaver Co. Financing not yet provided for. M. J. Baker, Jr., Rochester, consult. engr.

Alta., Medicine Hat—Municipality, F. Blackburn, city clk., subway under Canadian Pacific R. R. tracks, **$100,000**. J. E. Armstrong, ch. engr. Canadian Pacific R. R. Windsor Station, Montreal, Que., in association with municipality, engrs.

Ont., Port Arthur—Municipality in association with Provincial Govt., bridge on Trans-Canada Highway, **$150,000**. S. E. Flook, City Hall, in association with Dpt. Hys., Toronto, engrs.

★**Que., Quebec City**—Municipality, in association with Canadian National Railway Co., H. A. Dixon, ch. engr., 360 McGill St., Montreal, subway at Crown St., **$2...,000**; subways to eliminate level crossings at Bridge and Marie Incarnation Sts., **$350,000**. E. Hamel, City Hall, city engr. CD 1/12—11/18.

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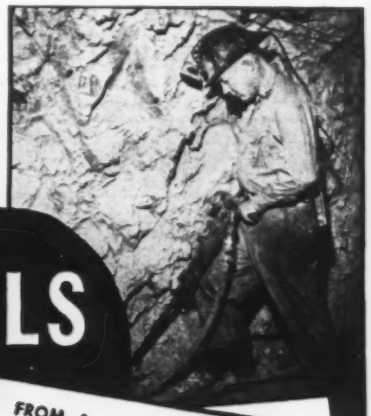

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Thor Positive Short-Travel Tubular Valve uses effectively every ounce of air that enters the machine . . . measures air to a tolerance of .00025 of an inch!

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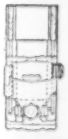
Extra-powerful rotation through extra sturdy rifle bar assembly and positive, non-slip ratchet action prevents stalling, even in heavy, sticky formations . . . full air power behind the piston gives the steel maximum forward and rotating power.

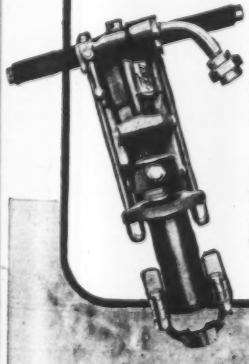


● AUTOMATIC LUBRICATION

On each reciprocation of the Thor piston hammer, oil is forced under pressure through a felt filter pad to keep every part of the machine constantly lubricated.

● OPERATING EASE

The Thor four-position throttle gives the operator complete control of drilling speeds for all operating conditions. Exclusive Thor spring retainer design provides quick, easy removal of the steel—provides longer life with fully enclosed springs that cannot clog or be over-tightened.



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Thor air economy in turning every foot of air into power combines with powerful rotation to provide steady, maximum hole-cleaning ability.

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Sizes
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meet all needs

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POSTWAR PROJECTS (Cont'd.)

Que., Quebec City—Municipality, viaduct over St. Vallier St., as part of Blvd. following St. Cyrille St. along to St. Paul St. $200,000. E. Hamel, City Hall, city engr.

STREETS AND ROADS

PROPOSED WORK

★**Calif., Fresno**--City, street imprvs. $2,310,000.

★**Calif., San Jose**—Santa Clara Co., San Jose, road projects. $2,802,000.

Kan., Atchison—D. Van Ness, city mgr., City Hall, roads and streets, $173,798.

Mo., Boonville—City, resurfacing streets. $35,000.

★**New Hampshire**—State Hy. Dpt., Concord, road mix 8 mi. Northwood to Lee, $400,000; 6 mi. Nashua and Hollis, $340,000; surface treated gravel 5 mi. Newport and Sunapee, $350,000; road mix and bridges 2.2 mi. Milton, $300,000; plant mix 5 mi. Hudson, $300,000; plant mix and bridges 4.5 mi. Wilmot and Milford, $530,000. Financing not yet provided for. CD 8/2—ENR 8/24.

N. Y., Poughkeepsie—Comrs. Dutchess Co., imprv., road. $39,900. State Aid Planning Funds allotted.

O., Fostoria—City, F. E. Blaser, Ser. Dir., City Hall, $40,000 bond election Nov. 7, widening Main St. CD 7/20—ENR 8/10.

★**Ont., Toronto**—Dpt. Planning & Development, Parliament Bldgs., Toronto, 116 mi. highway to Red Lake, to mining area in Kenora-Rainy River Dist., $2,500,000-$3,000,000.

PLANS UNDERWAY

★**Illinois**—State Hy. Dpt., Springfield, 20 mi. concrete hy. belt line around Cairo tieing in with proposed super hy., Alexander Co. $600,000. W. W. Polk, ch. hy. engr.

Ill., Decatur—City, City and County Bldg., plans completed resurfacing N. Jasper St., Sangamon to Garfield Sts., $50,000; widening, resurfacing E. Packard St., Main to Water Sts., $25,000. Financing not yet provided for. J. M. Weir, city engr. CD 10/18—ENR 10/21.

★**Ill., Decatur**—City, City & County Bldg., plans 95% completed widening, repaving E. Wood St., Maffit St. to Nelson Blvd., $265,000; plans 50% completed widening, resurfacing S. Franklin St., Macon to Ruth Sts., $75,000; plans 25% completed paving N. Monroe St., I. C. R. R., to McKinley Ave., $63,000; plans resurfacing N. Monroe St., Eldorado St. to I. C. R. R., $75,000; elimination of jog at Monroe and Eldorado Sts., $10,000; widening, resurfacing S. Monroe St., Main to Wood Sts., $15,000; E. and W. Grand Sts., city limits to Woodford St., $300,000; opening, paving cut off along B. & O. R. R., Williams to Eldorado Sts., $30,000; exten., paving S. Bway. St., Garrison St. to Route 47, $30,000; widening, paving, resurfacing N. and S. Bways., Garrison St. to city limits, $225,000. J. M. Weir, city engr.

Ill., Eldorado—City, City Bldg., making plans asphalt resurfacing Locust, 4 and Organ Sts., etc. $75,000. R. D. Brown, County Bldg., Saline Co. supt. hys.

Ill., Mt. Vernon—Jefferson Co., Court House, plans 40% completed gravel or crushed stone surfacing 8½ mi. State Aid 12 from Mt. Vernon northwest, $50,000; plans 65% completed 4 mi. State Aid 9, beginning 1 mi. west Waltonville, etc., $30,000; plans 80% completed 2 mi. State Aid 16 running south 2 mi. from Marion Co. line, incl. 70 ft. steel bridge, $25,000; plans 50% completed 4¼ mi. State Aid 17 from Boueford north to S.B.I. 15, $25,000; plans 40% completed 5 mi. beginning S.B.I. Route 148, running north and east to S.B.I. 148, $40,000; plans 4 mi. from Emerson City west and north to Scheller, $25,000; 6½ mi. S.B.I. 15, running north and west to Richview, $45,000; 5 mi. State Aid Route 5 and 6B running north from Franklin-Jefferson Co. line, $40,000; 5 mi. S.B.I. Route 37, running east to State Aid Route 5, $40,000. T. C. Pitchford, Co. Court House, co. supt. hys.

Ind., Anderson—City, paving 16 St. from Arrow to Raible; widening, Marine Dr. and Madison Ave., 27, 25, 22 and 29 Sts. $75,000. V. Lee, city engr.

Ind., Anderson—Madison Co., Anderson, 15 mi. concrete highway from Anderson to Elwood, incl. grading, culverts and small concrete bridges over 2 creeks, $350,000; new road connecting State Road 109 at Ohio Ave. to E. 10 St., extended and from Grand Ave. from 10 St. to State Road 9, $40,000; new highway from state highway to southwest of Anderson, running north and connecting with new Anderson-Elwood Hy., $80,000. C. V. Windsor, Anderson, co. engr.

★**Mich., Detroit**—Dpt. P. Wks., City Hall, plans 59% completed pavement widening, imprv. following streets: McNichols, Stoepel to Wyoming Ave., $60,000; Puritan, Log Cabin to Livernois, $70,000; Nardin Park at West Chicago Blvd., $4,000; Davison Ave., Livernois to Wyoming Ave., $200,000; Holbrook Ave., G.T. R.R., to St. Aubin Ave., $50,000; Cadillac Sq., Woodward Ave. to Congress St., $60,000; Monroe Ave., Woodward to Randolph St., $40,000; St. Aubin Ave., Brewster to Adele St., $186,000. Geo. R. Thompson, City Hall, city engr. CD 8/16—ENR 9/7.

★**Mich., Detroit**—Wayne Co. R... 3800 Barlum Tower, plans ... concrete widening, resurfacing ... Rd. from Gratiot to Morang Av... Five Mile Rd. from Wyoming to ... Rd., $440,000; Fort St. from Du... to Lincoln Park, $300,000; concr... facing Greenfield Rd. from Alle... Line Rd., $780,000; concrete pav... ing and drainage structures ... from Schoolcraft to Base Line ... 000; Eureka-Savage Rd. from H... Dr. to Haggerty Rd., $138,000; ... Rd. from Merriman to Venoy Rd... Venoy Rd. from Michigan Ave. ... Hill Rd., $138,000; Base Line ... Farmington to Taft Rds., $500,000; ... sylvania Rd. to ... son Ave., $270,000; Sibley Rd. ... St. to Huron River Dr., $850,000, ... Smith, 3800 Barlum Tower, engr.

★**Mich., Detroit**—Wayne Co. R... 3800 Barlum Tower, plans ... grading, drainage 22 ft. concrete ... Beech-Daly Rd., $767,000; 11 mi. ... $850,000; widening, resurfacing Six ... from Wyoming Ave. to Lasher R... 000; Seven Mile Rd., Schaefer ... River Ave., $610,000. L. C. Smith, Co. Road Comn. engr.

Mich., Eloise—Wayne Co., Eloise Hospital, County Bldg., plans completed concrete pavement and sidewalk replacement, $50,000. Financing not yet provided for. L. C. Smith, 3800 Barlum Tower, co. hy. engr.

New York—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans underway relocating Route 60, 4 mi. north of Jamestown, incl. erecting overpass, steel-concrete over county-owned hy. at Kimball Stand, Chautauqua Co. $250,000.

N. Y., Douglaston—President Queens Boro. M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway repaving Horace Harding Blvd. from Douglaston Ave. to Nassau Co. line (PQS-56), $78,400. A. K. Johnson, asst. engr. in charge of highways.

N. Y., Fulconer—Chautauqua Co. Hy. Dpt., 454 N. Work St., extensive rehabilitation, repaving, exten. county-owned hy. sys., $250,000-$400,000. B. Chilson, co. supt. hys. and co. hy. engr.

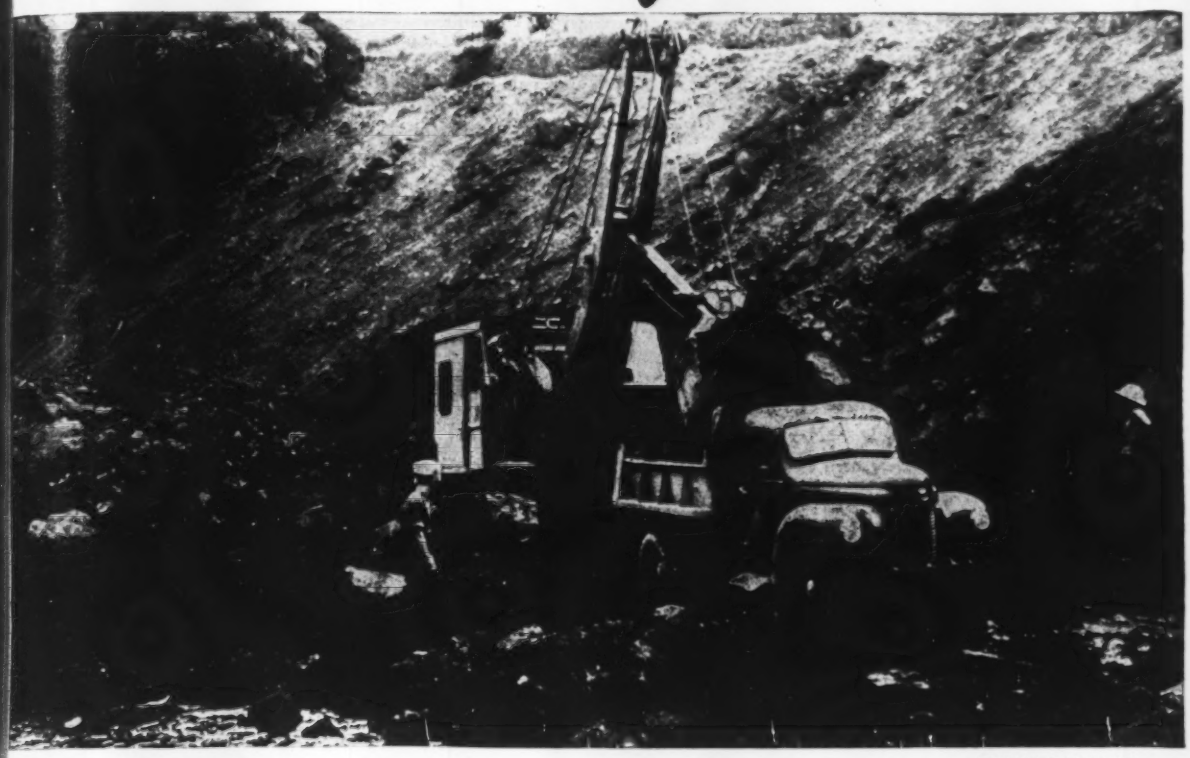
N. Y., Flushing—Queens Boro President M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway repaving Roosevelt Ave. from Willets Pt. Blvd. to Flushing River (PQS-58), $60,000. A. K. Johnson, asst. engr. in charge of highways.

N. Y., Jamaica—President Queens Boro. M. A. FitzGerald, comr. Boro Wks., 120-55 Queens Blvd., Kew Gardens, Zone 15, plans underway repaving Archer Ave. from Van Wyck Blvd. to Sutphin Blvd. (PQS-57), $9,800; reconstructing Linden Blvd. from Sutphin Blvd. to Hawtree Creek Rd. (PQS-63), $200,000. A. K. Johnson, asst. engr. in charge of highways.

★**N. Y., New York**—President Manhattan Boro, W. D. Binger, comr. Boro Wks., Municipal Bldg., Zone 7, plans 20% completed East River Dr. from Grand to ... Sts., incl. E. Houston St. Connection (PM-41 & 42), $1,545,000; plans 40% completed Harlem River Dr. from 2nd Ave. to ... Speedway, incl. bulkhead (PM-45), $15,055,000; plans underway widening, grading Houston St. from 6 Ave. to East River Dr. (PM-47), $2,488,000. D. G. Edwards, ch. engr.

★**N. Y., New York**—President Manhattan Boro, W. D. Binger, comr. Boro Wks., Municipal Bldg., Zone 7, repaving Lafayette St., Foley Sq. to 8 St., (PMS-211), $132,300; Amsterdam Ave., 72 to 78 Sts. (PMS-213), $9,163; Lewis St., Grand to Delancey Sts., (PMS-220), $5,490; Morningside Ave., 125 to 126 Sts. (PMS-227), $6,705; Morton St., Huston to Washington Sts., (PMS-228), $9,855; New Bowery, Oak St. to Chatham Sq., (PMS-230), $22,230; Division & Suffolk to Pitt Sts., (PMS-198), $5,600; Edgecombe Ave., 145 to 155 Sts., (PMS-2... $11,000; Frankfort St., Gold to William Sts., (PMS-202), $5,850; Gansevoort St., 4 to West Sts., (PMS-203), $20,475; Greene St., Bleecker to 8 Sts., (PMS-206), $18,540; Hancock Pl., St. Nicholas to Morningside Aves., (PMS-207), $5,813; Columbus Ave., 59 to 96 Sts., (PMS-190) $218,970; Clinton St., south to Madison Sts., (PMS-191), $16,... 493; Convent Ave., 130 to 133 Sts., and 13... to 138 Sts., (PMS-192), $14,025; Convent Ave., 138 to 140 Sts., (PMS-195), $6,510; Delancey St., East River Dr. to Cannon St., (PMS-196), $36,540; Ave. A, 20 to 24 Sts. (PMS-179), $27,400; Academy St., Seaman to Vermilyea Aves., (PMS-180), $22,500; Baxter St., Walker to Grand Sts., (PMS-184), $5,625; Bway., 125 to 135 Sts., (PMS-185), $81,027; Charlton St., MacDougal to Greenwich Sts., (PMS-188), $5,000; Cabrini Blvd., 177 St. to 181 St., and 186 to ... Sts., (PMS-189), $19,150; 14 St., ... Aves., (PMS-311), $84,780; 15 St., ... Aves., (PMS-312), $10,313; 21 St., ... Aves., (PMS-319), $5,463; 21 St., East River Dr. to 1 Ave., (PMS-320), $21,105; ... 3 to Lexington Aves., (PMS-322), $6,... 25 St., 3 to Lexington Aves., (PMS-... $7,155; 10 St., 5 to 6 Aves., (PMS-... $14,130; 10 St., Hudson to Washington ... (PMS-305), $7,245; 10 Ave., 14 to ... (PMS-307), $67,500; 10 Ave., 30 to ... (PMS-308), $80,370; Amsterdam Ave., ... 71 Sts., (PMS-309), $63,000; 10 Ave., ...

Land Battle Wagon....



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POSTWAR PROJECTS (Cont'd.)

emy to 207 Sts., (PMS-3[illegible]), $42,600; 1 Av[illegible] East Side, 110 to 118 St[illegible] (PMS-242), $[illegible] 470; 5 Ave., 118 to 12[illegible] Sts., (PMS-2[illegible] $17,235; 15 St., East Ri[illegible] Dr. to Ave. (PMS-286), $14,895; 34 St[illegible] 8 to 10 Av[illegible] (PMS-290), $12,562; 9 St[illegible] 3 Ave. to Univ[illegible] sity Pl., (PMS-302), $5,[illegible]38; 7 Ave., 30 to 34 Sts., (PMS-271), $33,[illegible]50; 8 Ave., 125 to 145 Sts., and 150 to 15[illegible] Sts., (PMS-[illegible] $92,000; 8 Ave., 155 to 159 Sts., (PMS-[illegible] $37,175; 9 Ave., Little West 12 to W[illegible] Sts., (PMS-275), $200,000; 9 Ave., W. 14 to 59 Sts., $199,735; Madison Ave., 125 to [illegible] Sts., (PMS-278), $9,525; 9[illegible] St., 1 to 2 Ave[illegible] (PMS-253), $10,170; 112 St., 3 to Mad[illegible] Aves., (PMS-256), $5,100; Worth St., Bro[illegible] to Church St., (PMS-261), $7,425; 4 [illegible] Lewis St. to 2 Ave., (PMS-265), $15,[illegible] 5 Ave., 60 to 110 Sts., (PMS-268), $[illegible] 000; 6 St., East River Dr. to Lewis [illegible] $7,785; St. Nicholas Ave., to 169 St. to [illegible] George Ave., (PMS-243), $198,585; Tra[illegible] verse Rd. 2, 79 St. and [illegible] Ave. to Cent[illegible] Park West (PMS-244), $11,085; Vanderv[illegible] St., Frankfort to Pearl Sts., (PMS-[illegible] $5,805; Vermilyea Ave., Dyckman to [illegible] Sts., (PMS-247), $50,265; West and M[illegible] ginal Sts., Battery Pl. to Gansevoort [illegible] (PMS-249), $120,000; Park Ave., 31 to [illegible] Sts., (PMS-232), $22,612; Park Ave., 34 to 42 Sts., (PMS-223), $22,750; Park Ave., [illegible] to 59 Sts., and 64 to 96 Sts., (PMS-[illegible] $160,000; Pearl St., Fulton St. to New Bo[illegible] ery, (PMS-235), $25,627; Sherman Ave., [illegible] Bway., (PMS-239), $116,640; St. Nicho[illegible] Ave., 114 to 121 Sts., (PMS-242), $17,[illegible] 37 St., 9 to 10 Aves., (PMS-292), $11,[illegible] grading, paving Leyden St., W. 235 St. to Tennison Pl., (PMS-174), $150,000; 142 [illegible] Hudson River Outlet Exten., (PMS-[illegible] $20,000; 152 St., Hudson River Outlet Exten. (PMS-177), $35,000; 158 St., Hudson Riv[illegible] Outlet Exten., (PMS-178), $10,000. [illegible] Aid Planning Funds alloted. D. G. Edwar[illegible] ch. engr.

N. Y., Queens Village—President Que[illegible] Boro, M. A. FitzGerald, comr. Boro Wk[illegible] 120-55 Queens Blvd., Kew Gardens, Zone [illegible] plans underway repaving Union Turnp[illegible] from 188 St. to Nassau Co. line (PQS-[illegible] $196,000. A. K. Johnson, asst. engr. [illegible] charge of highways.

N. Y., St. Albans—President Queens Bo[illegible] M. A. FitzGerald, comr. Boro Wks., 120-[illegible] Queens Blvd., Kew Gardens, Zone 15, pla[illegible] underway reconstructing Merrick Rd. [illegible] Proctor Hobson Park (PQS-61), $45,[illegible] A. K. Johnson, asst. engr. in charge [illegible] highways.

N. Y., Springfield Gardens—Presid[illegible] Queens Boro, M. A. FitzGerald, comr. Bo[illegible] Wks., 120-55 Queens Blvd., Kew Garde[illegible] Zone 12, plans underway reconstruct[illegible] Rockaway Blvd. from Southern Parkway [illegible] 150 St. (PQS-60), $200,000; grading, pav[illegible] Farmers Blvd. from Linden to Rockaw[illegible] Blvds. (PQS-54), $200,000. A. K. Johns[illegible] asst. engr. in charge of highways.

N. Y., Woodside—President Queens Bo[illegible] M. A. FitzGerald, comr. Boro. Wks., 120-[illegible] Queens Blvd., Kew Gardens, Zone 15, pla[illegible] underway repaving Roosevelt Ave. fr[illegible] Queens Blvd. to 58 St. (PQS-59), $200,0[illegible] paving under elevated structure on Quee[illegible] Blvd. between Van Dam St. and Roosev[illegible] Ave. (PQS-62), $125,000. A. K. Johns[illegible] asst. engr. in charge of highways.

O., Springfield—City, A. J. Dillon, mg[illegible] City Hall, plans 5% completed paving 1[illegible] mi. Park Blvd. from Rock Creek to Be[illegible] ment Ave.; Park Blvd., under N.Y.C.R.[illegible] near Mitchell Blvd., $250,000. Financing [illegible] yet provided for.

Pa., Bradford—City Council, street wide[illegible] ing, paving, $100,000. J. H. Quirk, City Ha[illegible] city engr.

★ **Ont., Timmins**—Municipality, A. [illegible] Shaw, clk., 298,750 ft. concrete sidewalk[illegible] $127,826; 69, 639 ft. concrete paving, $[illegible] 915; asphalt paving 294,521 sq. yd., $[illegible] 612; curbs, gutter 181,800 ft., $109,380. J. [illegible] MacLean, Town Hall, engr.

CONTRACTS AWARDED

Que., La Tuque—Municipality, A. Garn[illegible] town mgr., constructing streets and si[illegible] walks, day labor. $150,000.

EARTHWORK, WATERWAYS

PROPOSED WORK

★ **Arizona**—Bureau Reclamation, Inter[illegible] Bldg., 19 and C Sts. N.W., Wash., [illegible] D. C., authorized power installation, Boul[illegible] Canyon Proj.; under study transmissi[illegible] lines, Parker Dam power proj., $3,010,0[illegible] canals, pumps, Gila, Wellton-Mohawk Di[illegible] Proj., $9,420,000; concrete dam, power plan[illegible] Bridge Canyon Proj., $207,432,000; tunne[illegible] aqueduct, canals, Colorado-Phoenix Div[illegible] sion Proj., $333,000,000, all foregoing C[illegible] orado River; concrete dam, Bill Williams [illegible] Alamo Reservoir Proj., Williams Rive[illegible] $3,200,000; earth dams, canals, Chino, Snow[illegible] flake, Winslow, Hassayampa, Holbrook a[illegible] miscellaneous projects, Little Colorado Riv[illegible] $16,833,000; concrete dam, power plan[illegible] Buttes Proj., Gila River, $7,000,000; co[illegible] crete dam, Coconino Proj., Little Colora[illegible] River, $4,000,000; earth dam, Sentinel Pro[illegible] Gila River, $10,000,000.

Calif., San Jose—Santa Clara Co., drain[illegible] program. $300,000.

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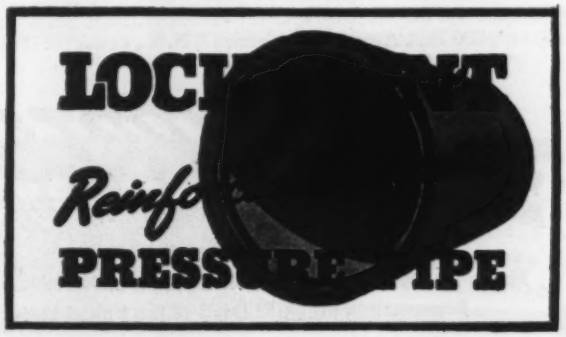

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POSTWAR PROJECTS (Cont'd.)

★**†Colorado**—Bureau Reclamation, Interior Bldg., 19 and C Sts. N.W., Wash. D. C., authorized earth dam, canals Fire Mountain Division Proj., River, **$1,373,000**; concrete and earth drains San Luis Valley Proj., Rio River, **$17,200,000**; under study 2 Laplata Proj., San Juan River, earth dam, canals, San Miguel Proj., Miguel River, **$1,500,000**; Hunter Mesa Colorado River, **$1,500,000**; Collbran, Creek, **$1,632,000**; Silt Proj., **$1,245,000**; West Divide Proj., Colorado **$941,000**; Florida Proj., Animas River, **500,000**; canals, drains. Pine River Proj., Pine River, **$1,370,000**; earth and crete dams, canals, power plants, tunnel River-South Platte Proj., Blue River-South Platte River, **$148,000,000**; dams, canals, cellaneous projects, **$5,000,000**; earth 3 power plants, Montrose Power Proj., compahgre River, **$3,850,000**; concrete earth dams, canals, tunnels, Gunnison-kansas, Proj. Gunnison River, **$34,** earth dam, canals, drains. Upper Proj., Dolores River, **$11,600,000**; earth Paonia—Minnesota Div. Proj., River, **$797,000.**

★**†Idaho**—Bureau Reclamation, Interior Bldg., 19 and C Sts. N.W., Wash. D. C., authorized pump. plant, canal, drum Prairie-Post Falls Unit Proj., Spokane River, **$300,000**; earth dam Mann Creek Mann Creek, **$930,000**; under study dams, pump. plants, canals Mountain Proj., Snake River, **$90,000,000**; earth canals, Cambridge Bench Proj., Pine **$360,000**; Council Proj., **$500,000**; Mesa **$300,000**, both Weiser River; Malad Proj., Devil Creek, **$670,000**; Hornet Hornet Creek, **$300,000**; Lewiston Proj., Sweetwater Creek, **$1,000,000**; dam, power plant, Cabinet Gorge Clark Fork, **$12,600,000**; concrete dam, beni Falls Proj., Pend Oreille River, **$5,000**; earth dam Challis Proj., Salmon **$500,000**; pump. plants, canals, Rathdrum Prairie Proj., Spokane River, dams, canals Medicine Lodge and miscellaneous projects, **$2,500,000**; 2 earth canals Montpelier Proj., Bear River, **$000**; earth dam, canal Paris Proj., Sleight Creek, **$500,000**; earth and concrete power plant, Oneida Proj., Bear River, **000,000.**

†Illinois—U. S. Eng., West Memphis, earth levee, beginning at point below on Ohio River and exten. 10 mi. south approx. 250,000 yd. earth and 2 flood Alexander Co. **$125,000.**

Ill., Jacob—Fountain Bluff & DeGo★Drainage & Levy Dist., 16 mi. dirt incl. floodgates, raising, widening levee, 7,000,000 yd. earthwork, **$550,000-000.**

★**†Kansas**—Bureau Reclamation, Interior Bldg., 19 and C Sts. N.W., Wash. D. C., under study canals, diversion Bostwick Proj., Republican River, **$6,** earth dams pumps, miscellaneous **$1,000,000.**

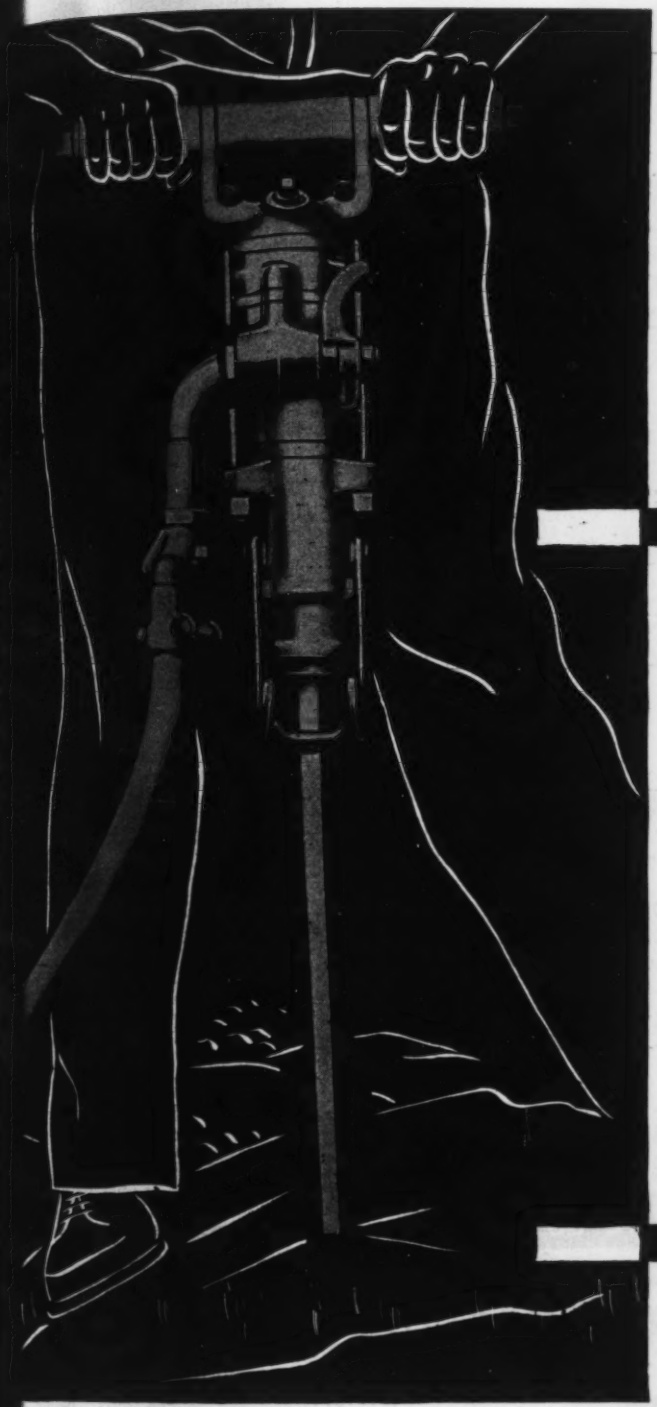
★**Mich., Detroit**—Wayne Co. Port of troit Comn., 2333 Barium Tower, port facilities on Detroit River **$300,000**; pleasure craft harbor on River waterfront, incl. dredging, dock mooring facilities, **$400,000**; cut-off across Point Hennepin, Grosse Ile, River, Wyandotte vicinity, incl. channel for navigation purposes, **$400,**

★**†Montana**—Bureau Reclamation, Interior Bldg., 19 and C Sts., N.W., Wash. D. C., authorized canals Bitterroot (Woodside) Proj., **$1,070,000**; under earth dam, canals, drains remainder root Valley Proj., **$2,814,000**, both River; authorized power transmission Fort Peck Power Proj., Missouri **$6,200,000**; pumps, canals Intake Proj., Yellowstone River, **$62,000**; study canals, pumping plants Missoula ley, Bitterroot River, **$172,000**; plant, canals, drains Buffalo Rapids, div., **$1,029,000**; pumps, canals, Savage **$220,000**, both Yellowstone River; 16 River Pumping projects, Missouri **$2,391,000**; South Bench Proj., River, **$718,000**; miscellaneous **$5,000,000**; pumping plants, canals Souris-Montana Div., Missouri **030,000**; Yellowstone River Pumping Yellowstone River, **$521,000.**

★**†Nebraska**—Bureau Reclamation, Interior Bldg., 19 and C Sts., N.W., Wash. D. C., under study earth dam, canals, Republican Proj., **$947,000**; earth canals, power plant, Bostwick Proj., **413,000**, both Republican River; earth canals, Miscellaneous Projects, **$2,500,**

★**†Nevada**—Bureau Reclamation, Interior Bldg., 19 and C Sts. N.W., Wash. D. C., under study diversion dam, drains Humboldt Proj., Humboldt River **$374,000**; pumps, canals, Fort Mohave Colorado River, **$123,000**; earth dam, plant, canals Upper Truckee Proj., River, **$5,535,000**; earth dam, tunnels, power plant Washoe Lake Proj., Lake **$5,200,000**; earth dams, canals miscellaneous projects (Colorado River, etc.), **$5,000,000.**

★**†New Mexico**—Bureau Reclamation, Interior Bldg., 19 and C Sts. N.W., Wash. 25, D. C., under study diversion dam, canal Hammond Proj., San Juan River, **$725,** Fort Sumner Proj., Pecos River, **$615,** 3 earth dams, drains Middle Rio Grande Valley Proj., Rio Grande River, **$16,000,** canals, Springer Proj., Canadian River



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POSTWAR PROJECTS (Cont'd.)

$800,000; dam enlargement, Alamogo Proj., Pecos River, **$1,270,000**; earth da canals, Mora Proj., Mora River, **$2,500,** miscellaneous projects, **$1,000,000**; ea dam, power plants, canals San Juan-Ch Diversion Proj., San Juan River, **$13,900,** concrete dam, power plant, Cliff Reser Proj., Gila River, **$9,500,000.**

★**†Oklahoma** — Bureau Reclamation, terior Bldg., 19 and C Sts. N.W., W 25, D. C., under study canals, Fort Sm Proj., North Canadian River, **$234,000**; C ton Proj., North Canadian River, **$1,** earth dam canals, Englewood Proj., Cim ron River, **$5,900,000**; miscellaneous projec **$1,000,000**; Kenton Proj., Cimarron Riv **$3,900,000**; Fort Cobb Proj., **$2,** Barnitz Proj., **$2,500,000**; Foss Pr **$6,500,000**; earth dam, Rainey Mounta Reservoir Proj., **$2,400,000**, all foregoi Washita River.

★**†Okla., Bartlesville**—U. S. Eng., 221 Main St., Denison, Tex., Hulah Dam fl control project near Arkansas River. **$** **850,000.**

★**†Oregon**—Bureau Reclamation, Inter Bldg., 19 and C Sts. N.W., Wash., D. C., under study canals, pump. pla Canby Proj., Molalla River, **$290,000**; 2 ea dams, canals, drains, Grande Ronde Pro Grande Ronde River, **$13,115,000**; earth da canals, pumps, Crooked River (Ochoc Proj., Crooked River, **$1,680,000**; earth da canals, Yamhill Proj., Yamhill Riv **$7,200,000**; Illinois Valley Proj., Illino River, **$5,300,000**; Merlin Proj., Rogue Riv **$2,904,000**; Bully Creek Reservoir Proj., M heur River, **$1,217,000**; Talent Proj., Be Creek, **$2,342,000**; Wapinitia, Paulina miscellaneous projects, **$2,500,000**; earth da canals, power plant Deberger Gap Pro Rogue River, **$13,740,000**; Baker Pro Powder River, **$3,663,000.**

★**†Texas** — Bureau Reclamation, Inter Bldg., 19 and C Sts. N.W., Wash., D. C., under study earth dam, canals Sabi Proj., Sabinal River, **$1,725,000.**

★**†Utah** — Bureau Reclamation, Inter Bldg., 19 and C Sts. N.W., Wash., D. C., under study earth dam, tunnel, can Hurricane Proj., Virgin River, **$3,400,** Gooseberry Proj., Prince River, **$1,400,** earth dam, canals, pumps, Ogden Riv Exten. Proj., Ogden River, **$3,000,000**; pum plant, wells, canals Weber Delta Pro Weber River, **$927,000**; earth dam, cana Vernal Proj., Ashley Creek, **$1,800,** Ouray Valley and miscellaneous projec **$5,000,000**; Santa Clara Proj., Santa Cla Creek, **$1,500,000**; Emery Co. Proj., Cotto wood Creek, **$3,715,000**; concrete dam, pow plant, Uintah-Echo Park Unit Proj., Gree River, **$46,000,000**; earth dikes, canals, M nila Proj., Henrys Fork, **$1,462,000**; co crete dam, tunnels, canals, Farmingt Proj., Weber River, **$2,200,000**; concrete da pumps, canals, Cutler Proj., Bear Riv **$5,000,000**; earth dam, power plant, Dew Reservoir Proj., Colorado River, **$41,000,** earth dam, canals Moon Lake Exten. Pro Duchesne River, **$4,500,000**; Woodruff Pro Bear River, **$3,000,000**; concrete dam Bl Proj., San Juan River, **$16,000,000.**

★**†Washington**—Bureau Reclamation, Inte lor Bldg., 19 and C Sts. N.W., Wash., D. C., under study earth dams, canals, Bu bank and miscellaneous projects, Columb River, **$2,450,000**; concrete dam, power plan Foster Creek Project, Columbia River, **$7** 500,000**; canals, pumps, drainage, Gree Puyallup-Auburn Unit Project, Green Rive **$2,500,000.**

★**†Wyoming**—Bureau Reclamation, Interi Bldg., 19 and C Sts. N.W., Wash., D. C., authorized canals Kendrick Proj North Platte River, **$1,584,000**; under stu earth dam, canals, La Barge, Fontenell Shell Creek, miscellaneous projects, **$2,500,** 000; Evanston Proj., Bear River, **$2,000,** Pinedale, Kendall Reservoir Proj., Gree River, **$10,081,000**; Lyman Proj., Smith Fork, **$2,365,000**; concrete dam, power plan Kortes Proj., North Platte River, **$7,045,** earth dam, Little Snake River Proj., Litt Snake River, **$310,000**; Stump Creek Proj Stump Creek, **$550,000**; diversion dam, canal Seedskadis Proj., Green River **$4,543,000.**

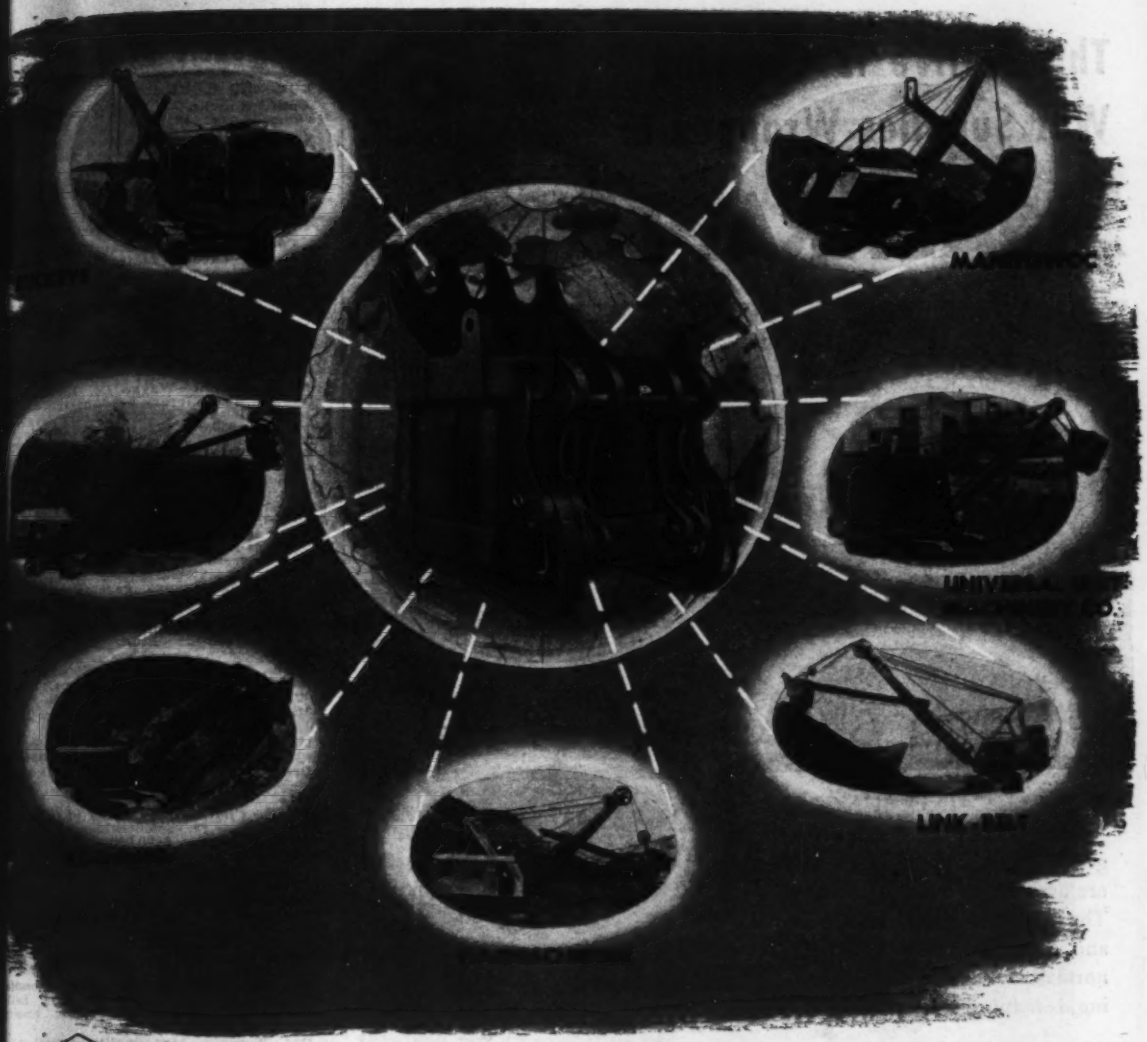
Ont., Timmins—Municipality, A. L. Sha clk.; reclaiming river banks. **$50,000.** J. MacLean, Town Hall, engr.

PLANS UNDERWAY

★**Mich., Trenton**—Wayne Co. Port Detro Comm., 2333 Barlum Tower, Detroit, In dustrial District Channel along waterfro of Detroit River south of Trenton Chann providing water transportation to and fro Industrial plants, **$700,000**; dredged chann from Brownstown Twp. to Lake Erie, crea ing addnl. industrial sites and providin shorter water route to Lake Erie and throug water traffic in Detroit River west of Grose Ille, **$3,800,000.** W. C. Cowling, 2333 Bar lum Tower, Detroit, engr.

★**Tex., Corpus Christi**—U. S. Eng., 25 S and Avenue F, Galveston, plans 15% completed boat and barge channel betwee here and Port Isabel. **$5,000,000.**

★**Tex., Raymondville**—Willacy Co., Ray mondville, plans 10% completed, 400x8 ft. deep water Port Basin, **$1,000,000**; co structing connecting channel on Corpu Christi-Port Isabel Intercoastal Channe **$1,000,000.** Purefoy & Patterson, Kingsvill consult. engrs.



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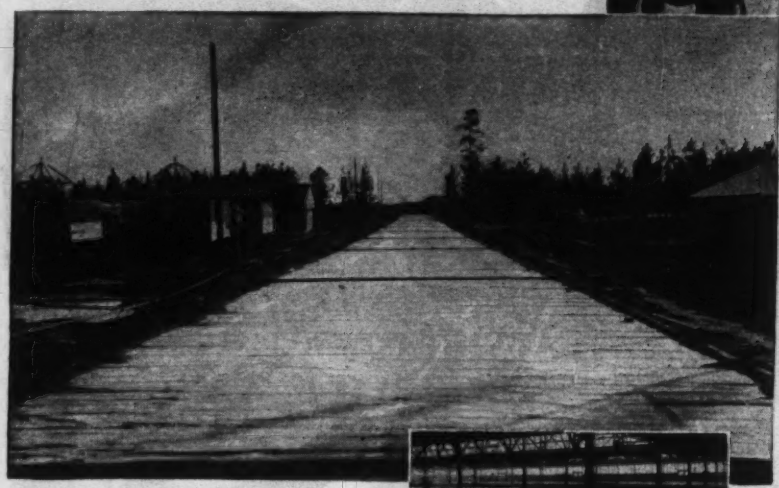

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PUBLIC BUILDINGS

PROPOSED WORK

Calif., Eureka — City, gymnasium and swimming pool. $212,000.

Calif., Eureka—Humboldt Co., county hall of records, $300,000; veterans bldg. $75,000; school, $6,000, site acquired.

Calif., Placerville—Eldorado Co., hospital, $200,000.

★**Calif., Sacramento**—City, hall of justice and health center, $650,000-$750,000.

★**Conn., Bridgeport**—State, Brig. Gen. B. De Lacour, State House, Hartford, brick, steel armory, incl. training grounds and community athletic facilities, $500,000. Land rights not cleared, financing not yet provided for.

Ill., DuQuoin—DuQuoin High School Bd., 100, E. E. Thornton, secy., 2 story, basmt., brick school bldg., on site next to present high school athletic field. $150,000-$200,000.

Mich., Detroit—Wayne Co. Library, 160 Trumbull Ave., library headquarters bldg. at Wayne, $150,000; branch library bldgs. at Plymouth, $30,000, Trenton $30,000, Inkster $20,000, Allen Park $20,000, Belleville $20,000, Flat Rock $30,000, Melvindale $20,000, Garden City $20,000, Redford Twp. $20,000.

★**Mich., Eloise**—Wayne Co. Infirmary, Eloise, bakery and storage bldg., $200,000; 3 story, basmt. employees bldg., $650,000; brick, steel concrete Bldg. N addn., psychopathic section, $1,150,000; story laundry bldg., $200,000; 2 story, brick, steel, concrete main shops, $100,000; vocational and maintenance shop, $125,000; power house, boilers, pumps, generators, $500,000; Bldg. G replacement, $900,000; 3 story, basmt. Bldg. F replacement, $545,000; story, basmt. women's infirmary, $900,000; 3 story, basmt. Bldg. E replacement, $900,000.

Mich., Eloise—Wayne Co., Eloise Hospital, brick, steel, concrete occupational therapy bldg., for hospital group. $422,000.

Mich., Mt. Clemens—Macomb Co., County Bldg., jail. $250,000.

Minn., Luverne—Bd. Educ., M. C. Munson, supt., high school gymnasium. $150,000.

Ore., Portland—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash., 25, D. C., 20 story federal office bldg.

★**S. C., Charleston**—College of Charleston, 66 George St., science bldg., library and dormitory. Over $500,000. Financing not yet provided for, land rights not cleared.

Wash., Tacoma—Pierce Co., Court House, hospital alterations. $150,000.

Alta., Medicine Hat—Municipality, F. Blackburn, city clk., recreational centre, $250,000.

N. S., Halifax—Halifax School Bd., J. Myrden, chn., Roman Catholic High School, Windsor St. and Quinpool Rd. $250,000.

Ont., New Toronto (Postal District Toronto)—Municipality, technical school for Lakeshore District east of Ontario hospital grounds, $150,000.

Ont., Toronto—Municipality, central police bldg. with office space and adequate cells accommodating prisoners on remand, replacing present Police Station 2 on Dundas St. and Police Station 4 on Parliament St. $350,000.

★**Ont., Waterloo**—Municipality, hospital for incurables and county court house addn., $1,000,000.

PLANS UNDERWAY

★**Calif., Santa Barbara**—Santa Barbara State College, Mission Ridge, plans by W. Soule, 116 E. Sola St., classroom bldg., $149,800; Physical Education bldg., $273,000; Home Economics bldg., $149,000; Psychology & Education bldg., $135,000; library, $252,000; Administration bldg., $90,000; auditorium, $315,000; utilities and grounds, $140,000, all at La Mesa Campus.

★**Conn., East Hartford**—Town Bd. Educ., Town Hall, plans by Tooker & Marsh, 101 Park Ave., New York, N. Y., brick, steel, stone high school, $1,500,000; brick, steel school, $152,000; 2 story, basmt., brick, steel Woodland School addn., alterations, $175,000; brick, steel South End School, $250,000. CD 1/21—ENR 2/10.

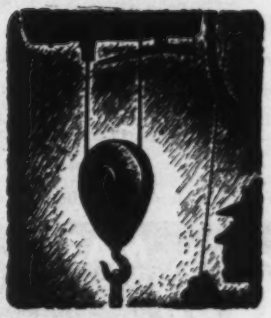
★**Conn., Rocky Hill**—State, Veterans Home Bldg. Com., West St., Rocky Hill, preliminary plans underway by D. Orr, 940 Grove St., New Haven, Veterans' Home, incl. hospital and nurses' home addns., barracks, staff and utility bldgs., etc. $1,400,000.

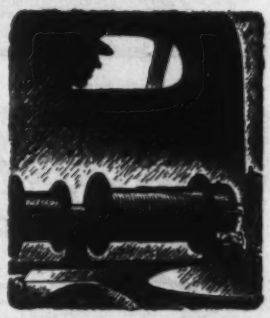
Conn., Stamford—Town, L. C. Staples, supt. Schools, 59 Prospect St., plans 75% completed by F. L. S. Mayers, 2 West 47 St., New York, N. Y., brick, steel Junior High School, Hope St. $175,000.

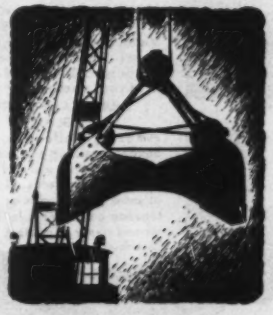
★**Ga., Atlanta**—Georgia School of Technology, 225 North Ave. N.W., plans by R. L. Aeck, c/o owner, administration and classroom bldg., library and connecting museum and colonade, $850,000.

★**Ill., Springfield** — State, preliminary sketches by C. Herrick, Hammond, state archt. Armory Bldg., Springfield, 2 story, concrete state museum on block bounded by First, Monroe, Spring and Adams Sts.

Why
B-E-T-H-L-E-H-E-M F-O-R-M - S-E-T
spells
E-C-O-N-O-M-Y







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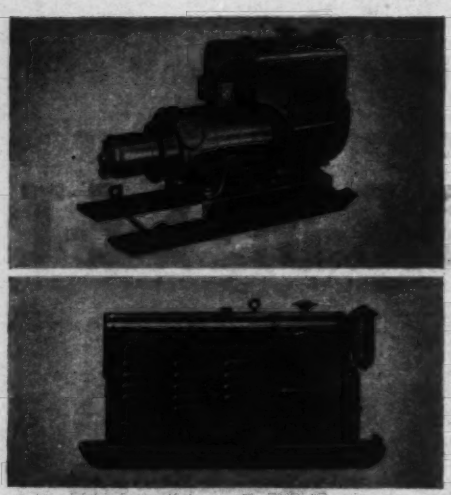

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POSTWAR PROJECTS (Cont'd.)

$2,050,000. Land rights not cleared, financing not yet provided for.

★**Ind., Anderson**—City, G. M. Rogers, pr... School Bd., A. Chadd, supt. School... Forest Manor, plans by E. F. Miller, And... son Bank Bldg., school, ... and Delaware Sts., **$160,000**; Central Junior High Scho... on recently purchased grounds W. 12 a... Morton Sts., **$300,000**; South Side Jun... High School, 29 and Jackson Sts. **$250,0...** CD 3/31/43—ENR 9/2/43.

★**Ind., Hammond**—Bd. School Trustees, C. C. Sohl, chn., 6935 Hohman St., ... liminary plans by L. Crosby Bernard, ... Forest Ave., technical high school, **$600,0...** L. Besozzi, 314 Hammond Bldg., mech. engr.

★**Ind., Kokomo**—Trustees School Bd., C. ... Haworth, supt. Schools, plans underway by McGuire & Shook, 1400-01 Fletcher Trust Bldg., Indianapolis, 1 story, part basement, balcony, brick, stone rein.-con., structural steel field house for athletics, **$650,000.** Financing not yet provided for.

Kan., Holton—City, J. B. Bennett, mayor, preliminary plans municipal power plant, **$100,000.** Black & Veatch, 1706 Bway, Kansas City, Mo., consult. engrs.

★**La., New Orleans**—City, plans by W. R. Burk, Associated Architects & Engineers, Pan American Bldg., 4 story, hospital, **$300,000**; 200-bed capacity tuberculosis hospital, St. Louis and N. Ramparts Sts., **$200,000.**

★**Mich., Detroit**—Wayne Co., Port of Detroit Comm., 2333 Barlum Tower, terminal warehouse housing incoming and outgoing less-than-carload freight shipments, **$1,800,000.** W. C. Cowling, 2333 Barlum Tower, engr.

★**Mich., Ecorse**—Wayne Co. Port of Detroit Comm., 2333 Barlum Tower, Detroit, port terminal in downriver sect. Detroit River for transfer of ocean borne bulk commodities to trunkline railroads, **$2,800,000.** W. C. Cowling, 2333 Barlum Tower, Detroit, engr.

Mich., Grand Rapids—Bd. Educ., 143 Berwick St. N.E., plans underway by R. Allen, 1029 Grand Rapids National Bank Bldg., brick, steel, stone, rein.-con. Junior High School, **$175,000.**

Mich., Grand Rapids—Michigan Soldiers' Home, 3000 Monroe St. N.W., plans underway by R. Allen, 1029 Grand Rapids National Bank Bldg., brick, concrete domiciliary, **$270,000.**

Mich., Lansing—Bd. Educ., Lansing, plans by Herrick & Simpson, 1065 Bauch Bldg., brick, steel, concrete, stone school. **$375,000.**

Neb., Falls City—G. S. Lyon, mayor, City Hall, power plant, **$50,000.** R. Fulton, 112 S. 19 St., Lincoln, consult. engr.

N. C., Raleigh—State College of Agriculture and Engineering of the University of North Carolina, Raleigh, sketches by P. Shumaker, c/o owner, mechanical engineering bldg., engineering laboratory, structural to house engineering experiment station. Over **$300,000.**

★**Ore., Salem**—State Bd. Control, Sales, plans underway by Whitehouse, Church, Newberry & Roehr, Railway Exchange Bldg., Portland, office bldg. **$1,000,000.** CD 2/10/43—ENR 3/4/43.

Tenn., Memphis—City, J. B. Boyle, comm., Police Station Headquarters, 2 and Adams Sts., plans completed by G. Mahan, Jr., Sterick Bldg., remodeling central police station, **$150,000.** Financing not yet provided for. CD 2/10—ENR 2/24.

★**Tex., Dallas**—City, plans by H. Bartholomew & Associates, 317 N. 11 St., St. Louis, Mo., and S. S. Hare, (master planners) Sophian Plaza, Kansas City, Mo., Senior High School, Beckley and Saner Sts., **$350,000**; Junior High School, near Adamson High School, **$400,000**; Junior High School, Forest Ave. High School, **$400,000**; high school north of Hines Blvd. and west of Cotton Belt R.R., **$450,000**; Junior High School, north of Hines Ave. and west of Cotton Belt Ry., **$350,000.**

Vt., Randolph—Town School Comm., Randolph, plans by Hudson & Ingram, 9 Bus St., Hanover, N. H., high school addn. Over **$150,000.**

Wis., Juneau—Dodge Co., W. Oberdick, clk., preliminary plans by Foeller, Schobe, Berner, Safford & Jahn, 310 Pine St., Green Bay, home for poor. **$185,000.** CD 2/17—ENR 3/9.

Ont., Peterborough—Municipality, electric sub-station, rebuilding parts of distr. sys., $50,000. Utilities Comm., R. L. Dobbin, mgr., 223 Aylmer St., engr.

Ont., Port Arthur — Municipality, community center. **$200,000.** S. E. Flook, City Hall, engr.

Ont., Timmins—Municipality, A. L. Shaw, clk., fire hall and warehouse for machinery, **$150,000.** J. D. MacLean, Town Hall, engr.

★**Ont., Toronto**—Municipality, plans by A. S. Mathers, 96 W. Bloor St., Masonic Hall on scale of miniature Radio City, **$500,000.**

Que., Quebec City—Municipality, health centre bldg., **$150,000**; workshop and other public works department bldgs., on Hare Pointe property. **$150,000.** E. Hamel, City Hall, city engr.

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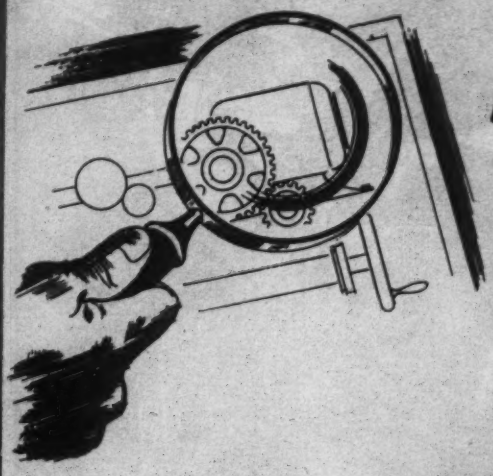

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POSTWAR PROJECTS (Cont'd.)

Que., Quebec City—Municipality, drawing, exten. civic hospital, $200,000. E. H... City Hall, city engr.

Sask., Saskatoon — Municipality, ... nurses' residence, City Hospital. ... electrical substation, $40,000. G. E. Ar... bald, City Hall, acting city engr. ENR 1/27.

COMMERCIAL BUILDINGS

PROPOSED WORK

Ill., Decatur—The James Milliken U... versity, 1200 Block West Main St., medi... Elizabethan style architecture dormit... $150,000-$200,000, and science bldg., $250,0... both 3 story, brick, concrete fdn.

★**Ill., Mt. Vernon**—Sisters of St. Fran... Good Samaritan Hospital, 605 N. 12 ... brick hospital, cement fdn., adjoining pr... ent hospital. $500,000.

Mich., Detroit—Woman's Hospital, 421 ... Hancock Ave., brick, steel, rein.-con. ho... tal addn. $300,000.

Miss., Holly Springs—Rust College, Dr. ... D. Redmond, pres., Holly Springs, rais... funds, administration bldg. $300,000.

Mo., St. Louis—Francis H. Kennedy, et ... Hiemens Real Estate Co., 714 Chestnut S... Zone 1, housing on site fronting 535 ft. ... 5200 blocks of South Broadway, $500,0... Site purchased.

★**N. Y., New York**—Wm. Barken & ... Greenberg, 639 West End Ave., Zone ... apartment, Bway. and 96 St. Over $500,0...

N. Y., New York—Cannon Constr. Co... 521 Fifth Ave., Zone 17, apartment, ... 100x161 ft. plot, at 136-148 7 Ave., southw... corner 19 St. Over $150,000.

★**N. Y., New York**—W. B. Chrysler Bl... Corp., Chrysler Bldg., Zone 17, o... bldg., on 100x200 ft. plot, 43 St. and Th... Ave. Over $1,000,000.

N. Y., New York—Syndicate, c/o I. Bu... sky, 570 7 Ave., Zone 18, 6 story apartm... on 100x175 ft. site, 322-334 E. 63 St. O... $150,000.

O., Shaker Heights—Cleveland Cath... Diocese, c/o Bishop E. F. Hoban, N.B... Bldg., Cleveland, convent and academ... $300,000. Land rights not cleared and finan... ing not yet provided for.

Pa., Bradford—Dresser Mfg. Co., Bra... ford, 3 story, bsmnt., brick, steel, concr... office bldg. $150,000.

★**Pa., Chester** — Bd. Directors Ches... Young Men's Christian Assn., YM... Bldg., 2 community bldgs. $675,000.

Pa., Overbrook—Friends Central Sch... 68 St. and City Line, field house. $150,0... Funds available.

★**Tenn., Nashville**—J. Cheek, 8 Ave. a... Commerce St., hotel, $600,000-$700,000...

Tex., Dallas—Bradford Memorial Hospit... 3512 Maple St., nurses home. $150,000.

Tex., Houston—Adath Emeth Congregati... c/o Rabbi M. Landman, 607 White St., schu... $150,000.

Tex., Houston—Memorial Hospital, ... Lamar St., 5 story, rein.-con., brick str... nurses training school, dormitory, $250,0...

★**Tex., San Antonio**—Interstate Circu... Inc., Majestic Bldg., theatres, Nogal... and Linares Sts., $150,000; on N. Zarzam... St., $150,000; on Fredericksburg Rd. a... Santa Barba St., $150,000; on San Pedro a... Hildebrand Ave., $150,000; theatre, locati... not yet selected. $150,000.

Wash., Tacoma—Fisher Co., 1104 Bw... department store imprvs. $300,000.

PLANS UNDERWAY

Calif., Altadena—Westmont College, ... S. Westmoreland Ave., Los Angeles, pla... by G. Stanley Wilson, 3681 6 St., Riversi... dormitory, science bldg., library, art bld... gymnasium and chapel accommodating 1,... students. $400,000. Site purchased.

Calif., Long Beach—R. E. Campbell, ... E. Weber Ave., Compton, plans underw... by T. Criley, Jr., 607 Architects Bldg., L... Angeles, 5 story, bsmnt. garage addn. ... Lafayette Hotel, $200,000.

★**Calif., Oakland**—Kahn's Departme... Store, 1501 Bway., plans underway ... W. G. Corlett & A. W. Anderson, Bank ... America Bldg., 4 story, rein.-con., str... tural steel department store bldg. addn. ... alterations, incl. increased 100 ft. Bw... frontage, $1,000,000.

★**Calif., Pasadena**—Bullocks, Inc., 7 ... Bway., Los Angeles, plans underway ... Wurdeman & Becket, 6535 Sunset Bl... Hollywood, 3 story Class A department st... on 380x960x967 ft. site, Dell Mar St., El... son and Lake Aves. $2,000,000. CD 7/1... ENR 7/27.

★**Calif., San Francisco**—Owner, c/o J. ... Bolles & J. Francis Ward, archts., ... Market St., prepared preliminary plans ... structures wearing apparel center. $4,000,0...

★**Colo., Longmont**—St. Colletta School, ... 3, Jefferson, Wis., plans nearing com... pletion by E. Brielmaier & Sons Co., 118 ... Water St., Milwaukee, Wis., home for e... ceptional children, administration and sch... bldg., 8 cottages, central heating pla... elevator. $500,000-$600,000. CD 12/1... ENR 12/16.

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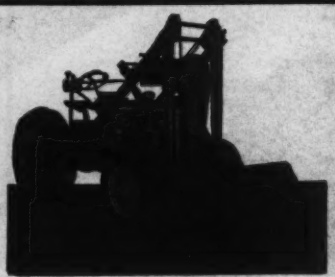

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TREATING PLANTS

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Long Island City, N. Y.

POSTWAR PROJECTS (Cont'd.)

Conn., Stratford—A. M. Pickus, Stratford Theater, 1422 Main St., plans by O. C. Ziroll, 118 Wall St., Bridgeport, for limestone theater, 2 wings for small stores and park landscaping, equipped for television, circular driveway. $150,000.

Conn., Stratford—St. James RC Parish, J. H. Anderson, pastor, 2110 Main St., plans by G. J. Phelan, 311 State St., Bridgeport, 2 story, bsmnt., school and altering present residence for convent. $150,000.

★**Ill., Evanston**—Washington National Insurance Co., H. R. Kendall, chn. Bd., 610 Church St., Evanston, plans completed by Graham, Anderson, Probst & White, 35 E. Jackson St., Chicago, 7 story, brick, stone and steel office bldg., on Chicago Ave. between Church and Davis Sts., and connecting 19 story main office bldg., at 610 Church St., and 7 story annex on rear of property. $1,000,000.

Ind., Indianapolis—Roman Catholic Diocese, Bishop J. Ritter, 14 and Meridian Sts., plans by D. A. Bohlen & Son, 1001 Fairbanks Bureau Bldg., church and school, 38th St. between Orchard and Forest Manor Aves. $300,000. Land rights not cleared.

Ia., Estherville—Sisters of Sorrowful Mothers, 6718 Cedarburg Rd., Milwaukee, Wis., sketches by E. Brielmaier & Sons, Consulting Engrs., 735 N. Water St., Milwaukee, 2, Wis., 50-bed addn. to Holy Family Hospital.

La., Alexandria—Baptist Hospital, Alexandria, plans 5% completed by Ed. F. Neild, City Bank Bldg., Shreveport, hospital expansion. Over $150,000.

★**N. Y., New York**—Ashley Apartments, Inc., P. Sinnott, Jr., pres., 621 Tiffany St., Zone 59, plans completed by H. Lillie, 2095 Bway., Zone 23, 10 story, 115 x 143 ft. brick, apartment Grand Concourse and 169 St. $750,000.

★**N. Y., New York**—Emigrant Industrial Savings Bank, 51 Chambers St., Zone 7, plans completed by Boak & Raad, 175 Fifth Ave., Zone 10, plans completed apartment, Madison Ave. and 89 St. $1,000,000.

★**N. Y., New York**—Emigant Industrial Savings Bank, 51 Chambers St., Zone 7, plans completed by Harrison Fouilhoux & Abramowitz, 45 Rockefeller Plaza, Zone 20, 23 story, office and mfg. bldg., southerly blockfront Nassau St. from Beekman St. to Theatre Alley. $2,000,000.

★**N. Y., New York**—515 Seventh Ave. Corp., D. A. Harris, pres., 1359 Bway., Zone 18, plans completed by Ely Jacques Kahn and Robert Allan Jacobs, 2 Park Ave., Zone 16, 32 story, 98x200 ft. bldg. containing office, showrooms, stores and mfg. space, 513-525 Seventh Ave. $3,000,000.

★**N. Y., New York**—53rd Organizing Corp., c/o I. J. Berger, archt., 44 E. 53 St., Zone 22, plans completed 15 story office and showroom bldg., 44-56 E. 53 St. $750,000.

★**N. Y., New York**—Fred F. French Investing Co., 551 Fifth Ave., Zone 17, plans completed by W. I. Hohauser, 1 Bway., Zone 23, 12 story, 131x241 ft., apartment bldg., E. 41 St. and Prospect Pl. $800,000. V. Mayper, 110 W. 40 St., Zone 18, consult. engr.

★**N. Y., New York**—C. J. & M. Ginsberg, 30 Broad St., Zone 4, plans completed by S. Bien, 9 E. 46 St., Zone 17, 20 story apartment house, on 167x175 ft. site, 858 Fifth Ave., corner 69 St. $1,750,000.

★**N. Y., New York**—Guaranty Trust Co. of N. Y., 140 Bway., Zone 7, plans completed by H. P. Jaenike, 33 W. 47 St., Zone 19, 19 story, penthouse apartment, 856 Fifth Ave., $2,013,000; 19 story penthouse, 10x1 ft. apartment, 828 Fifth Ave., $360,000; story, penthouse apartment, 4-8 E. 64 St. $240,000.

★**N. Y., New York**—Industrial Equities Inc., 385 Madison Ave., Zone 17, plans completed by J. Martine, 15 E. 40 St., Zone 16, 17 story loft bldg., 325-37 E. 45 St. $1,000,000.

N. Y., New York—Jobreen Realty Corp., c/o H. I. Feldman, archt., 415 Lexington Ave., Zone 17, plans completed 6 story apartment, 180 W. Houston St. $175,000.

★**N. Y., New York**—Revenue Realty Corp., E. H. Zogat, pres., 1819 Bway., Zone 23, plans completed by H. I. Feldman, 415 Lexington Ave., Zone 17, 19 story, penthouse apartment, 128-130 Lexington Ave. $1,000,000.

★**N. Y., New York**—Seaman's Bank for Savings, 74 Wall St., Zone 5, plans completed by E. J. Hurley, c/o owner, 19 story penthouse apartment, 71 Riverside Dr., corner W. 79 St. $850,000.

★**N. Y., New York**—720 Third Ave. Corp., L. Dowdney, pres., 285 Madison Ave., Zone 17, plans completed by S. S. Goldstone, 285 Madison Ave., Zone 17, 35 story commercial bldg., 720-24 Third Ave. $2,250,000.

N. Y., New York—Shapwise Realty Corp., c/o DeYoung, Moscowitz & Rosenberg, archts., 205 E. 42 St., Zone 17, plans completed 12 story, penthouse apartment, 5 W. 54 St. $300,000.

N. Y., New York—Sheldon Estates, Inc., c/o H. Herbert Lilien, archt., 215 E. 57 St., Zone 51, plans completed 10 story apartment, 51 W. 92 St. $450,000.

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POSTWAR PROJECTS (Cont'd.)

N. Y., New York—3538 Park Ave. C... P. Schupak, pres., 370 Ft. Washington A... Zone 33, plans completed by H. I. Feld... 415 Lexington Ave., Zone 17, 6 story ap... ment house. 1661-81 St. Nicholas Ave., ... ner Fairview Ave. $450,000.

★**N. Y., New York**—Timken Realty C... W. R. Timken, pres., 597 Madison A... Zone 22, plans completed by Ely Jac... Kahn & Robert Allan Jacobs, 2 Park R... Zone 16, altering 17 story bldg., 561... 7 Ave. $700,000.

N. Y., Rego Park—F. R. Bridlie, c/o ... Rothstein & Sons, archts., 391 Fulton ... Brooklyn, Zone 1, plans completed 6 st... 100x110 ft., apartment, 82 Rd. and Qu... Blvd. $487,000.

N. Y., Rego Park—S. Leider, c/o M. Ro... stein & Sons, archts., 391 Fulton St., Bro... lyn, Zone 1, plans completed 110x120 ... apartment, 67 Rd., north of Austin ... $450,000.

N. Y., Rego Park—E. Minskoff & ... Abramson, c/o S. Bien, archt., 9 E. 46 ... New York, Zone 17, plans completed 97x1... ft. apartment, 75 Rd. and Queens Bl... $150,000.

N. Y., Rego Park—M. Minskoff, c/o S. Bi... archt., 9 E. 46 St., New York, Zone 17, pl... completed 6 story, 100x170 ft. apartme... 67 Drive and Booth St. $180,000.

N. Y., Rego Park—Saunders Park Estat... c/o H. I. Feldman, archt., 415 Lexing... Ave., New York, Zone 17, plans complet... 6 story, 130x200 ft. apartment, 64 Rd. fr... Queens Blvd. to Saunders St. $350,000.

Tex., Brownsville—The Mexico Theat... Brownsville, plans 25% completed remod... ing 1 and 2 story theatre. $150,000.

Tex., Houston—Gaspar M. DeGeo... Estate, c/o A. Lamantian, Ambassador H... tel, 919 Fanin St., plans 50% completed c... verting existing 7 story hotel and apa... ment bldg., into 64 efficiency apartmen... $450,000.

★**Tex., San Antonio**—Interstate Circ... Inc., Majestic Theatre Bldg., plans ... derway 5 neighborhood theatres. $150,... each.

Tex., San Antonio—E. L. McKemie, ... tional Bank Commerce Bldg., plans ... H. P. Smith, National Bank of Commer... Bldg., permanent type tourist courts. O... $150,000.

Wis., West Allis—Carmelite Sisters, 1... S. 52 St., Zone 14, plans by E. Breilmaier ... Sons Co., 735 N. Water St., Milwaukee, Zo... 2, 2 story, bsmnt. children's home addn.

Man., Brandon—Canadian National Ry... H. A. Dixon, ch. engr., 360 McGill S... Montreal, Que., enlargement Prince Edwa... Hotel. $150,000.

★**Que., Quebec City**—Canadian Pacific ... Co., J. E. Armstrong, ch. engr., Windso... Station, Montreal, 600 room hotel and ... swimming pool, convention and banquet ha... to Chateau Frontenac Hotel, $2,000,000.

CONTRACTS AWARDED

Calif., Los Angeles—Farmers Automob... Inter-Insurance Exchange, 4680 Wilsh... Blvd., add 3 rein.-con. stories to existi... bldg., to Wm. Simpson Constr. Co., Arch... tects Bldg., $300,000. Claude Beelman, 1... Union Bank Bldg., archt.

Mo., Overland (br. St. Louis)—Schra... Building & Realty Co., R. J. Schrader, pre... 6651 Enright Ave., St. Louis, Zone 5, ... bungalows on 45 acres tract beyond here, ... St. Louis Co. Owner builds. $250,000 pl... Site obtained.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Mo., Doniphan—PLANT—Wright Leath... Specialty Co., c/o Denver M. Wright, 1... Manchester Ave., Maplewood, St. Lou... Zone 17, 2 story, bsmnt., brick leather goo... mfg. plant. $75,000, incl. equip.

★**N. Y., Syracuse**—PLANT—General Ele... tric Co., River Rd., Schenectady, ... plant, incl. administration bldg., researc... laboratory, assembly shops, for Electroni... Dpt. on 150 acre plot. Over $1,000,000.

N. C. Charlotte—STORAGE—Carey Tra... fer & Transportation Co., H. D. Albrig... mgr., Charlotte, storage bldg., West Pal... St. Over $40,000.

Pa., Easton—PLANT—Mack Printing C... c/o C. S. Fleck, Easton, plant addn. $200,...

Tex., Galveston—PLANT—Central Dai... Products Co., 1st National Bldg., Oklahom... City, Okla., ice cream mfg. plant. Ow... $50,000.

Wash., Tacoma—BOTTLING PLANT... Coca Cola Bottling Co., 2360 Fawcett ... bottling plant. $200,000.

★**Wash., Tacoma**—MILL, etc.—St. Reg... Paper Co., Tide Flats, Tacoma, pap... mill and bag plant. $3,000,000.

Wyo., Cheyenne—PLANT—Frontier Refi... ing Co., Cheyenne, converting existing 15... octane plant into black oil mfg. unit, et... $250,000; large steel tank storage farm f... black oil and asphalt.

Alta., Lethbridge—BAKERY, etc.—Ki... son Milling & Elevator Co., Ltd., Lethbridg... bakery and 4 modern residences. $65,...

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GENERAL

, George W. Brown,
wn Superintendent,
lworth, New York.

ar Mr. Brown:

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Don B. Smith, Sales Manager

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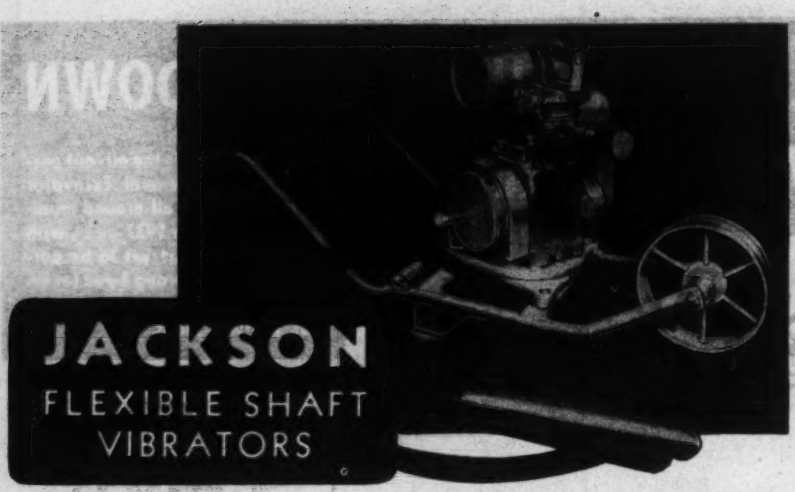

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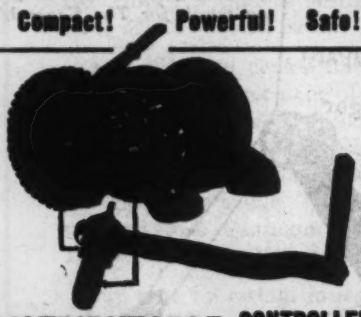

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POSTWAR PROJECTS (Cont'd.)

Alta., New Dayton—STORAGE ANNEX—Ellison Milling & Elevator Co., Ltd., L... bridge, permanent grain storage ... $40,000.

B. C., Vancouver—FACTORY—Bartle ... Gibson Co., Ltd., c/o Robertson, Douglas ... Symes, 640 W. Pender St., factory. $50,0...

Ontario—PLANT—Marathon Paper Mills ... Canada, Ltd., Rochschild, Wis., U. S. ... plant.

Ont., London—FACTORY—Alma Paint ... Varnish Co., W. Wolfe, mgr., 65 Duke ... 2 brick, concrete factory bldgs. $40,000.

Ont., London—PLANT—A. Blashill, R. ... 6, London, plant. $100,000.

P. E. I., Summerside—PLANT—Geo. W... Summerside, fish processing plant.

PLANS UNDERWAY

Md., Baltimore—BOTTLING PLANT—Pepsi Cola Bottling Co., 400 Key Highway ... Bway. and Hartford Rd., plans by A. ... Radziszewski, 20 E. Lexington St., bottl... plant. $300,000.

N. Y., New York—GARAGE—Fred ... French Investing Co., 551 Fifth Ave., Z... 17, plans completed by W. I. Hohaus ... 1841 Bway., Zone 23, 2 story, basmt. st... age, 40 St. and Prospect Pl. $70,000. ... Mayper, 110 W. 40 St., Zone 18, cons... engr.

Okla., Hugo—TURBINE UNIT, etc.—P... lic Service Co. of Oklahoma, 600 S. Main ... Tulsa, plans 50% completed steam turb... unit addn., and auxiliary equip. to generat... plant. $350,000.

★**Okla., Tulsa**—TURBINE UNIT, etc.—Public Service Co. of Oklahoma, 600 ... Main St., plans 60% completed addn. st... turbine unit and auxiliary equip. to gener... ing plant. $900,000.

Pa., Reading—WAREHOUSE—Corruga... Container Corp., Grace and Meade Sts., pl... completed by N. Grossman, c/o owner, wa... house. $175,000.

Tenn., Memphis—LAUNDRY—Apex La... dry, Inc., J. L. Whitescarver, mgr., ... Lamar St., pans completed by Hanker ... Heyer, Commerce Title Bldg., rebuilding ... story, brick laundry bldg. $100,000.

Tex., Brownsville—PLANT—Food M... chinery Corp., Harlingen, plans 50% co... pleted by Bartlett Cocke, Milam Bldg., S... Antonio, 1 story, 120x600 ft. food produ... plant on 32 acre site. $200,000. W. E. Sto... son, Milam Bldg., San Antonio, consult. en... CD 12/16—ENR 12/23, under Industr... Bldgs.

Utah., Ogden—SERVICE—Utah Power ... Light Co., Kearns Bldg., Salt Lake C... plans by L. S. Hodgson, Eccles Bldg., ser... ice bldg. $100,000.

★**Wash., Tacoma**—DEPOT—Chicago, M... waukee, St. Paul & Pacific Ry. Co., W. ... Penfield, ch. engr., Union Station, 6, I... new depot. $1,250,000.

Alta., Calgary—PASSENGER STATION—Canadian National Rys., H. A. Dixon, ... engr., 360 McGill St., Montreal, Que., a... Canadian Pacific Ry. Co., J. E. Armstron... ch. engr., Windsor Station, Montreal, Que... new union passenger station. $250,000.

CONTRACTS AWARDED

Ky., Louisville—PLANT—C. T. Dear... Printing Co., 11 and Bway., 2 story bl... addn., to Struck Constr. Co., 147 N. C... St. $250,000.

Tex., San Antonio—WAREHOUSE, etc.—Summers Drug Stores Inc., 250 Colle... St., warehouse storage and training sch... bldg., to H. B. Zachry Co., P.O. Box 1... San Antonio, approx. $150,000. Adams ... Adams, 250 College St., archts.

PROJECTS CANCELLED

Tex., Houston—MECHANICAL SHOP—Southwest Wheel Corp., 1433 Travis S... Houston, mechanical shop. $75,000. Proje... cancelled. To be built at once. CD 10/14... ENR 11/4.

UNCLASSIFIED

PROPOSED WORK

★**Calif., Fresno**—PARKS, etc.—City, park ... bldgs., grounds, $1,245,000; recreation ... structures and imprvs., $125,000; electric ... work, $179,000.

Calif., Lakeport—AIRPORT—Lake C... Lakeport, airport. $100,000.

★**Calif., San Jose**—AIRPORT, etc.—San ... Clara Co., airport, $720,000; wate... parks, $150,000.

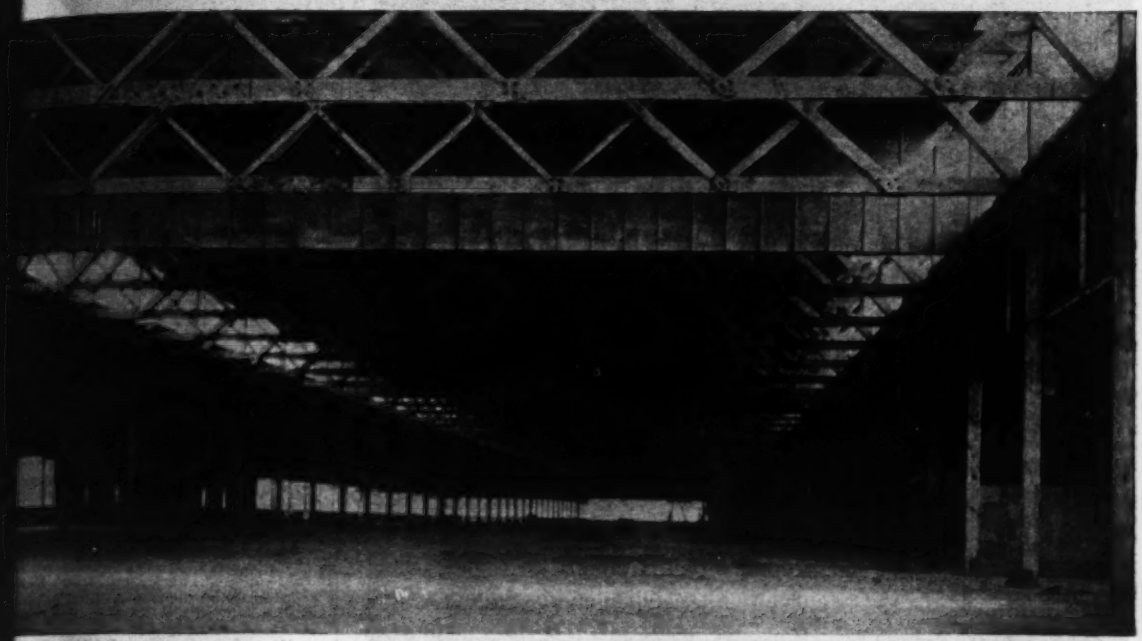
†**Conn., Danbury**—AIRPORT—Civil Aer... nautics Admin., 385 Madison Ave., N... York, N. Y., airport repairs, expansion in... work, lighting sys., landing runways, park... bldg. $250,000.

Conn., Guilford—BATHING BEACH, e... —Town, L. I. Dudley, first selectman, Tow... Hall, bathing beach, bathhouses, etc. $25,0...

Ill., Decatur—RADIO STATION—Co... modore Broadcasting, Inc., WSOY, Du... tur. FM radio station. Over $25,000.

Ill., Mt. Vernon—PARK, etc.—Mt. Vern... City Park Bldg., City Hall, new park ... swimming pool, south part of town, $100,0... enlarging present pool, $25,000; blacktop ... about 3 mi. park roads, $30,000; 4 ten...

TECO FOR WAREHOUSES TOO



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POSTWAR PROJECTS (Cont'd.)

courts, open air theatre and band ... seating 3 or 4,000 people located either ... Mt. Vernon City Park or at park playgr... acres from Mt. Vernon Junior High Sch... $150,000.

Ill., Quincy—RADIO STATION—Dis... Broadcasting Co., WTAD, Quincy, FM r... station. Over $25,000.

Ill., Rock Island—RADIO STATION—... Island Broadcasting Co., WHBF, Sa... Bldg., FM radio station. Over $25,000.

Ill., Springfield—RADIO STATION—C... modore Broadcasting, Inc., Springfield, ... radio station, U.S. Hy. 36. Over $25,000.

Ill., Springfield—RADIO STATIO... WCBS, Inc., Leland Office Bldg., FM r... station. Over $25,000.

Ind., Bedford—AIRPORT—City, P. ... tutter, mayor, modern airport, $40,000 ... more.

Ind., Indianapolis—RADIO STATIO... Capitol Broadcasting Corp., WISH, Ed... Bldg., Indianapolis, FM radio station, C... $25,000.

La., New Orleans—RADIO STATIO... Loyola University, WWL, Roosevelt Ho... FM radio station. Over $25,000.

†**Me., Dexter**—AIRPORT—Civil Aero... tics Admin., 385 Madison Ave., New Y... N. Y., airport, incl. runways, etc. Over $2... 000. Financing not yet provided for.

Me., Phippsburg—BEACH DEVELO... MENT—State Park Comn., State Office B... Augusta, Popham Beach development, $... 000. Financing not yet provided for.

Md., Olney—RADIO STATION—FM De... opment Foundation, Olney, FM radio stat... Over $25,000.

†**Mass., Lawrence**—AIRPORT—Civil ... onautics Admin., 385 Madison Ave., ... York, N. Y., airport, two 4,000 ft. runw... hangars, etc. $400,000.

★**Mass., Northampton**—AIRPORT—C... Aeronautics Admin., 385 Madison A... New York, N. Y., airport, land construct... runways, paving, aprons, hangars, etc. $... 000.

Mass., Williamstown—AIRPORT—C... Aeronautics Admin., 385 Madison Ave., ... York, N. Y., airport, land construction ... ways, bldgs., etc. $250,000.

Mich., Muskegon—RADIO STATION—... backer Radio Corp., WKBZ, 432 Apple A... FM radio station. Over $25,000.

Mich., Saginaw—RADIO STATION—S... naw Broadcasting Co., WSAM, Bay ... Weiss Sts., FM radio station. Over $25,000.

Minn., Hutchinson—AIRPORT—C... E. R. Dennis, clk., preliminary sur... contemplated, municipal airport. $35,000.

Minn., Sauk Center—AIRPORT—City, J... Schoenhoff, city clk., City Hall, munic... airport. $25,000.

Mo., Kansas City—RADIO STATIO... Midland Broadcasting Co., KMBC, Pick... Hotel, FM radio station. Over $25,000.

N. J., Newark—RADIO STATION—W... Jersey Broadcasting Co., WHOM, 29 W... St., New York, N. Y., FM radio stat... Over $25,000.

N. J., Trenton—RADIO STATION—Me... Broadcasting Co., 600 Ingham Ave., ... radio station, Ewing Twp. $25,000.

N. Y., Brooklyn—RADIO STATION—... quency Broadcasting, Inc., 1 Hanson ... FM radio station. Over $25,000.

N. Y., Jamestown—RADIO STATIO... James Broadcasting Co., Hotel James... Bldg., FM radio station. To exceed $25,...

N. Y., Ogdensburg—RADIO STATIO... St. Lawrence Broadcasting Corp., WS... 2315 Knox St., FM radio station. Over $25,...

N. Y., White Plains—BROADCAST... STATION—Westchester Broadcasting C... WFAS, Post Rd. and Chester Ave., ... broadcasting station. Over $25,000.

O., Cleveland—BROADCASTING S... TION—WGAR Broadcasting Co., 12... Euclid Ave., FM broadcasting station, Br... view and Atkins Rds. $25,000.

O., Columbus—BROADCASTING STAT... —United Broadcasting Co., WHKC, 22... Gay St., FM broadcasting station, C... Rd. $25,000.

O., Steubenville—BROADCASTING S... TION—Valley Broadcasting Co., W... Steubenville, FM radio broadcasting sta... 6 mi. west of here. $25,000.

O., Toledo—BROADCASTING STATIO... Toledo Blade, 541 Spurr St., FM broadca... ing station. $25,000.

O., Youngstown—BROADCASTING S... TION—WFMJ Broadcasting Co., 101... Broadman St., FM radio broadcasting ... tion, Austintown Twp. $25,000.

Okla., Oklahoma City—BROADCAST... STATION—Plaza Court Broadcasting ... KOCY, Plaza Court. FM broadcasting ... tion, 204 North Robins St. $25,000.

Okla., Oklahoma City—BROADCAST... STATION—WKY Radiophone Co., Sk... Tower Hotel. FM broadcasting station ... north of here. $25,000.

Ore., Portland—BROADCASTING ... TION—Broadcasters Oregon Ltd., ... Southwest 19 Ave., FM broadcasting sta... $25,000.

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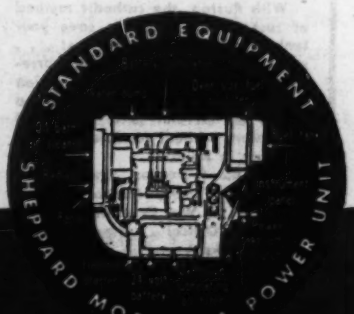

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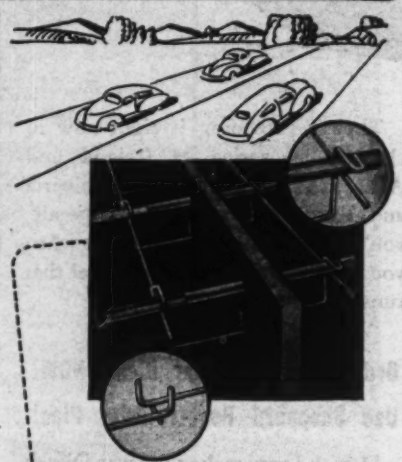

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POSTWAR PROJECTS (Cont'd.)

Pa., York—BROADCASTING STATION—Susquehanna Broadcasting Co., WSBA, FM broadcasting station, State Hy. 24, Spr Garden Twp. $25,000.

R. I., Providence—BROADCASTING ST TION—Cherry & Webb Broadcasting WPRO, 15 Chestnut St., FM broadcas station, near East Providence. $25,000.

R. I., Providence—BROADCASTING ST TION—Outlet Co., WJAR, 176 Weyb St., FM broadcasting station, Hartford and Victory St. $25,000.

S. C., Charleston—BROADCASTING ST TION—Atlantic Coast Broadcasting WTMA, 133 Church St., FM broadcas station, East Old Town Rd. $25,000.

S. C., Spartanburg—BROADCASTING ST TION—Spartanburg Advertising Co., WS 224 E. Main St., FM broadcasting stati Hogback Mountain. $25,000.

Tenn., Knoxville—BROADCASTING ST TION—American Broadcasting Corp., WE 531 S. Gay St., FM broadcasting stati $25,000.

Tex., Amarillo — BROADCASTING ST TION—Amarillo Broadcasting Corp., KF 109 E. 5 St., Amarillo, FM broadcas station, 109 E. 5 St. $25,000.

Tex., Beaumont—BROADCASTING ST TION—KRIC, Inc., 380 Wall St., FM bro casting station, 130 Wall St. $25,000.

Tex., Dallas—BROADCASTING STATI —A. H. Belo Corp., WFAA, 1121 Jack St., FM broadcasting station. $25,000.

Tex., Dayton — PARK — Town, T. Coll mayor, municipal park, 30 acre site donat Over $25,000.

Tex., Harlingen—STADIUM—City, re con. stadium. $75,000.

Tex., Wichita Falls — BROADCASTI STATION—Rhea Howard, Wichita Fa FM broadcasting station, Seymour Rd. of here. $25,000.

Utah, Salt Lake City—BROADCASTI STATION — Intermountain Broadcas Corp., KDYL, 143 S. Main St., FM broadc ing station. $25,000.

Va., Norfolk—BROADCASTING STATI —WTAR Radio Corp., National Bank Commerce Bldg., FM broadcasting stati National Bank of Commerce Bldg. $25,

Va., Richmond — BROADCASTING ST TION—Havens & Martin, Inc., WMBG, West Broad St., FM broadcasting stati Staples Mill Rd. near Broad Street $25,000.

Va., Richmond — BROADCASTING ST TION—Richmond Radio Corp., WRNL, E. Grace St., FM broadcasting station, C tral National Bank Bldg. $25,000.

Wash., Longview—FIRE ALARM SYST —City, City Hall, 25 box fire alarm $25,000.

Wash., Spokane — BROADCASTING ST TION—Louis Wasmer, Inc., KHQ, Ra Central Bldg., Zone 8, FM broadcast station. $25,000.

★ **Wash., Tacoma**—PIERS, etc.—Port Tacoma, altering piers and pier bl $1,750,000.

W. Va., Beckley — RADIO STATION Beckley Newspapers Corp., Beckley, radio station, Flat Top Mountain. Est. $ 000.

W. Va., Charleston—RADIO STATIO Charleston Broadcasting Co., WCHS, Lee St., FM radio station top Bee Mount on State Hy. 119. $25,000.

Wis., Green Bay — RADIO STATION Green Bay Newspaper Co., Walnut Madison Sts., FM radio station. Est. $ 000.

Wis., Oshkosh — BROADCASTING ST TION—Oshkosh Broadcasting Co., WO 151½ Main St., FM broadcasting stati Co. Hy. A. $25,000.

Wis., Wausau — BROADCASTING ST TION—Record Herald Co., Wausau, broadcasting station. $25,000.

Man., Winnipeg—AUTOMATIC DUMPE —National Grain Co., Ltd., Winnipeg, insta ing automatic dumpers along with adeq dust collecting sys., Lakehead Elevat $75,000.

Ont., Oshawa—PLAYGROUND and RE REATIONAL CENTER—Kinsmen Club Oshawa, development seven acre tract land as playground and recreational c ter, swimming pool, rest rooms $55,000.

Ont., Port Stanley—STORAGE TAN etc.—McManus Petroleums, F. J. Mc genl. mgr., 225 Rectory St., London, ma terminal consisting gasoline and oil stor tanks, pipelines, railway sidings. $75,

PLANS UNDERWAY

★ **Calif., Los Angeles**—AIRPORT—City P Wks., City Hall, expan. airport volving acquisition 1,844 acres supplem ing 625 acres now owned, incl. two 10,0 runways, administration and other bl $25,000,000. Funds available to purch site. L. Aldrich, City Hall, city engr.

Conn., Stratford—PARK, etc.—Town, Shea, mgr., Town Hall, park, incl. war m morial, athletic field Legion Bldg., grad drainage. $500,000. H. W. Johnson, Glenridge Rd., archt.

Ind., Greenfield — AIRPORT — Green Airport Co., R. A. Smitheman, pres., Main St., plans 25% completed airport. 000.

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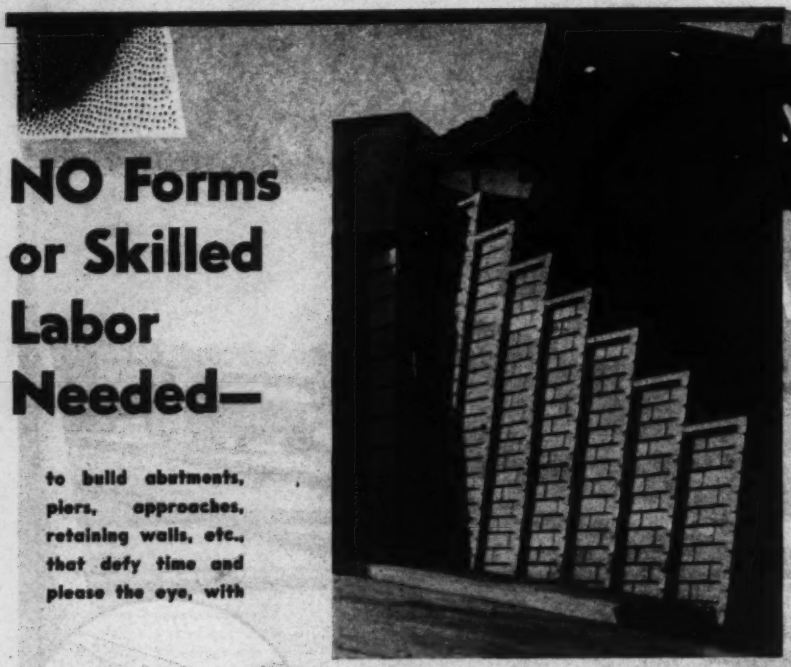

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POSTWAR PROJECTS (Cont'd.)

★La., New Orleans—AIRPORT TER... INAL, etc.—City, City Hall, ... and landing strips, $5,000,000. ... engr.

...AIRPORT—City Tra... ...plans under... ...5,000

...RETAINI... ...Dpt. Parks & Recreation, ... St., plans 15% completed $50 ... retaining wall, 20 ft. high, for ... Cemetery, $10,000; plans 15% co... pleted Livingstone Memorial landscap... impry. on Belle Isle, $206,000. Geo. Thompson, City Hall, city engr. CD 3/30; ENR 4/1/43.

Mich., Detroit—PARK IMPROVEMENT—Detroit Zoological Park Comm., Ten M... Rd., Royal Oak, concrete, steel pavil... $50,000; and Anthropoid Ape exhibit, $12... 000. Geo. R. Thompson, City Hall, city en...

★Mich., Northville—PARKWAY DEVE... OPMENT—Wayne Co. Rd. Comn., 1... Barium Tower, Detroit, Middle Rouge Pa... way exten., incl. 6 primary and 8 second... comfort stations, garbage incinerators, ... and storage and concession bldg., fe... bridges, gravel drives, bridle paths, pl... ground and picnic areas, drinking founta... etc., $810,000; Middle Rouge Parkway fr... Northville to Newburgh Rd., $290,000. L... Smith, 3800 Barium Tower, co. hy. engr.

Mo., Jefferson City—AIRPORT—City, a... port development etc. $200,000. Black ... Veatch, 4706 Bway., Kansas City M... engrs. CD 4/3—ENR 4/20.

Neb., Crete—SWIMMING POOL, etc.—C... F. Hobbs, mayor, City Hall, swimming p... and park recreational addns. $40,000. H. ... Davis, Crete, consult. engr.

Neb., North Platte—SWIMMING POOL... City, S. P. McFarland, mayor, City Ha... swimming pool. $65,000. R. F. Nosky, c... engr.

★New York — TUNNEL — President Ma... hattan Boro, W. D. Binger, comr. Bo... Wks., Municipal Bldg., Zone 7, New Yo... plans completed Brooklyn-Battery Tun... approaches, connections (PM-27). $10,025,0... D. G. Edwards, ch. engr.

N. Y., Buffalo—STREET LIGHTING—C... Council, Dpt. P. Wks., City Hall, prelimina... plans underway street lighting impry. pe... $400,000.

N. Y., New York—SUBWAY IMPROV... MENTS—President Manhattan Boro, W. ... Binger, comr. Boro Wks., Municipal Bld... Zone 7, plans underway subway entra... and exit alterations, W. 72 St. and Bw... (PM-13), $220,000; widening, altering s... way structures, Schiff Parkway from Bow... to Williamsburg Bridge (PM-38), $155,0... for Bd. Transportation, 250 Hudson ... Zone 13. D. G. Edwards, ch. engr.

★N. Y., New York—TRACK REMOVA... etc.—President Manhattan Boro, W. ... Binger, comr. Boro Wks., Municipal Bld... Zone 7, plans underway track removal a... pavement restoration Bway., 207 to 225 St... Bway., 225 St. to Boro Line, 207 St., Bwa... to Harlem River, Center Line, 225 St., Bwa... to Boro Line, 218 St., Bway to Car Ba... 10 Ave., Bway, to Car Barn, (PMS-171... $200,000; 59 St., 1 to 2 Aves., 59 St., 5 to ... Aves., pave curb to curb, (PMS-172), $20... 000; 181 St., Bway. to Washington Brid... Amsterdam Ave. 165 to 190 Sts., (PMS-16... $200,000; Bway., 169 to 207 Sts., (PMS-17... $200,000; Amsterdam Ave., 65 to 59 Sts., ... Ave., 59 to 42 Sts., 42 St., 10 to 12 Aves., ... St., 10 to 8 Aves., (PMS-167), $200,000; ... St., 8 to Madison Aves.; 42 St., Madison ... Park Aves., 42 St., Park to 1 Aves., ... Nicholas Ave., 162 to 169 Sts., (PMS-16... $190,000; Park Row, Bway. to James ... Chatham Sq., Bowery, Division St. to 1 Av... (PMS-163), $163,000; 3 Aves., 4 to 42 Sts... (PMS-164), $200,000; 3 Ave., 42 to 40 Sts... (PMS-164), $200,000; 3 Ave. 80 to 118 Sts... (PMS-165), $200,000; 3 Ave. 118 to 130 Sts... 125 St., East River Dr. to 8 Ave., (PMS-16... $200,000; subway alterations for roadw... widenings at various locations (PMS-17... $200,000. State Aid Planning Funds allotte... D. G. Edwards, ch. engr.

Tenn., Memphis — TESTING STATION ... City, J. Boyle, comr., Police Station, 1 a... Adams Sts., preliminary plans 90% co... pleted by Hanker & Heyer, Commerce Ti... Bldg., 6 lane automobile testing statio... $150,000.

N. B., Saint John—PARKS, etc.—Muni... pality, constructing parks and playgrou... $140,000; retaining walls, $100,000. D. ... Smith, City Hall, engr.

Ont., Timmins — SWIMMING POOLS ... Municipality, A. L. Shaw, clk., 2 swimmi... pools, $50,000. J. D. MacLean, Town E... engr.

Que., Montreal—SWIMMING POOLS—M... nicipality, J. A. Mongeau, city clk., ... swimming pools, $50,000 each. H. ... Gibeau, City Hall, engr.

★Sask., Saskatoon—FIRE ALARM SY... TEM, etc.—Municipality, installing f... alarm sys., equip., $100,000; imprv., ex... electrical distr. sys., $100,000; park and ri... bank imprvs., $200,000; natural gas ma... to Saskatoon and constructing distr. sy... connections and services within city, $4,0... 000. H. M. Weir, Saskatoon, acting city en... CD 1/17—ENR 1/27.

CONSTRUCTION REPORTS

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ELSIE EAVES, Manager *SCOTT McLEOD, Statistics* *J. A. MAHONEY, Reports*
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WATER SUPPLY

POSED WORK

, Perryville—Southern Natural Gas Co., Bldg., Birmingham, Ala., water cool- ..., $14,000.

Canton — Comrs. Stark Co., Canton, resolution to construct water distr. with fire hydrants for residents of Dist. of Reedburban Genoa Sewer in Genoa. $155,355. L. Zerbe, Canton.

, Fort Worth—City, S. H. Bothwell, City Hall, making plans water facili- $40,000. Applied for FWA funds to job. Freese & Nichols, Capps Bldg., ...

, Hinton—City, c/o L. Duncan, mayor, election to vote $125,000 bonds, water ...ewage disposal plant imprvs.

, Weatherford—City, C. Russell, may- ...king preliminary plans, water and ...extens. $50,000. Applied for FWA J. J. Rady, Insurance Bldg., Fort ..., engr.

, Wisconsin Rapids—City, bids soon ... 8 to 10 wells, later pump houses, ... etc. C. A. Cajanus, city engr.

, Minnedosa—Municipality, WW sys. T. H. Porter, Portage la Prairie, ...

ASKED

Bids Asked September 28

, Chilton—City, O. A. Horst, clk., ...houses, reservoirs, etc. Bids 8/29 re- CD 5/22—ENR 8/24.

Bids Asked October 2

, Algodones—Bero., E. W. Devitt, secy., ...ipal Bldg., 6 single cased wells or 2 ... well wells, 2 m.g.p.d. needed, steel ... 000 ft. 10 in. c.i. suction main and- ...g and 100 ft. 6 in. c.i. blow off mains, ... appurtenances, at Crow Island. ..., Plans deposit $15 refundable, 10% ...bond. Morris Knowles Co., 1312 Park ..., Pittsburg, engr.

Bids Asked October 3

, Ottawa—W. B. MacDonald, engr. c/o ...and Chairman Bd. Control, ity Hall, ...purification bldg. addn., 2 addnl. ...beds at Lemieux Water Purification ...$50,000. CD 8/1—ENR 8/9.

Bids Asked About October 16

, Fort Pierce—City, addnl. water sup- ...incl. 1 m.g. reservoir and treatment ...ties, $1,000,000. FWA. Smith & Gillies- ...Packard Bldg., Jacksonville, Zone 2, CD 9/15—ENR 8/25.

Bids Asked About October 18

, Fort Walton—City, addnl. water and ... facilities, $300,000. FWA. Smith & ...ie, Packard Bldg., Jacksonville, Zone ..., CD 8/24—ENR 6/31/44.

BIDDERS

, Hartford — Bd. Contr. & Supply ...olitan Dist., 756 Main St., Sept. 11, ...nical cleaning and lining with cement ... 7½ mi. 42 in. c.i. pipe by centrifugal ..., Nepaug Water Line 1, in Avon, ...ntica and Farmington, from Lock ... Pipe Co., Newington Ave., Newington ..., CD 6/21—ENR 8/24.

, Chicago—City, Dpt. P. Wks., City ..., Sept. 12, general contract superstruc- ...filter and administration bldgs., Dist. Filtration Plant, from S. N. ... Co., 2858 W. Augusta St. $1,497,000. ...79—ENR 8/31.

, Towson — Comrs. Baltimore Co., ... House, dismantling 300,000 gal. steel ... tank and tower, at Essex, and trans- ..., re-erecting here, Md. 18-302, from ...ugh-Dee Molines Steel Co., Neville Is- ..., Pittsburgh, Pa., $65,750. FWA.

, Concord—State, Comptroller Office, ... House, Sept. 13, addnl. water supply ... State Hospital, from Orr & Rolfe Co., ...ge St., $14,858.

, Knoxville—State Charitable & Penal ...titutions, Comm., W. O. Beard, secy., at ...A. G. Jeans, purch. agt., State Office ..., Nashville, Sept. 6, water treatment ... incl. 2 sedimentation and 1 coagula- ...tanks, 1 clear well tank, 2 filters, 2 ... at Eastern State Hospital, from Fred ...ks Constr. Co., 715 S. Bway., $79,847. ...31.

, Houston—City, M. H. Westerman, ... City Hall, Sept. 13, 8 in. c.i. watermain ...upter St. and 12 in. c.i. main in Oates ...wn W. A. McClendon, 4617 Walker Ave., $51,887, est. $50,000; 36 in. watermain high pressure line from pump station at Edlow, from Claude Everett, Inc., 522 Barzisa St., Houston, $96,800, est. $105,000; 30 and 36 in. collecting line from S.W. well field to S.W. pump station, from Lock-Joint Pipe Co., Ampere, N. J., $168,551, est. $175,000. J. Dannenbaum, City Hall, engr.

†Tex., Houston—Federal Works Agency, 801 Electric Bldg., Fort Worth, Sept. 13, Contr. 3, constructing, installing Water Supply Plants 1 and 2, incl. structures, drives, walkways, parking areas and fencing, valves, piping, etc., Tex. 41-644-F, from Gayle Bros., 303 Blodgett St., $90,040. J. C. Calhoun, Merchants Exchange Bldg., engr. CD 9/1.

CONTRACTS AWARDED

†Ga., Marietta—U. S. Eng., Post Office Bldg., Savannah, reservoir repairs, alterations No. MAP 5-45, at Aircraft Assembly Plant, to Arthur Pew Constr. Co., 2117 Piedmont Rd. N.E., Atlanta, $19,003. Bids 9/2.

N. H., Northfield — Golden Rule Farm Homes Assoc., W. R. Westwood, supt., Northfield, water supply for fire fighting, 75 x 150 ft. reservoir, piping, hydrant, to Manchester, Sand, Gravel & Cement Co., Inc., 339 Elm St., Manchester, $15,000. E. F. Mageneau, Center St., engr. Awarded 9/11.

Symbols and Abbreviations Include:

* Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily
A-E-M Architect-Engineer-Management type of contract

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings
Unclassified

Stages Reported

PROPOSED: (except Streets & Roads):
BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

O., Deshler — Village, K. L. Baughman, clk., Town Hall, water softener sys., to Gang Engr. Co., 31 N. Summit St., Akron, $33,000. Finkbeiner, Pettis & Strout, Home Bank Bldg., Toledo, engrs. CD 7/6—ENR 7/13.

†Tex., Camp Hood—U. S. Eng., Fort Sam Houston, water supply line repairs, own forces. $20,000. CD 6/12—ENR 6/15.

†Tex., Kelly Field—U. S. Eng., Fort Sam Houston, altering, imprv. water distr. and fire protective sys., to Truehart & Caldwell, American Hospital & Life Insurance Bldg., San Antonio, approx. $15,000.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., San Diego—City, Civic Center Bldg., 8,000 lin. ft. vitr. clay sanitary sewer. $142,000.

Fla., Fort Pierce—City, bids soon sewage treatment plant, $200,000. Smith & Gillespie, Packard Bldg., Jacksonville, Zone 2, engrs.

★†Fla., Orlando—City, making plans extens., imprv. sanitary sewerage sys. $1,800,000. FWA. Smith & Gillespie, Packard Bldg., Jacksonville, Zone 2, engrs.

★†Fla., Panama City—City, bids soon, sanitary sewerage sys. imprvs. $800,000. Smith & Gillespie, Packard Bldg., Jacksonville, Zone 2, engrs.

★†Ill., Granite City—City, approx. 17,500 ft. 18- to 84-in. relief sewers, necessary manholes, pump. sta., installing pump. equip., etc. Ill. 11-302-N. $531,936. FWA.

Ind., Syracuse—Town Bd., W. Zerby, pres., making plans, sewage treatment plant. $30,000. Don Lessig, Warsaw, engr.

Man., Minnedosa—Municipality, sewerage sys. $60,000. T. H. Porter, Portage la Prairie, sanitary engr.

†Mo., St. Louis County — Affton Sanitary Sewer Dist., sewerage sys. imprvs., addns., incl. installing approx. 5,500 ft. 8 in. sewer, 35 manholes, 3 pumps, constructing pumphouse, appurtenances, Mo. 33-284-N. $45,000. FWA.

O., Lakewood—City, A. F. Kauffman, dir. P. Wks., 14532 Lake Ave., $200,000 bond election Nov. 7, storm and sanitary sewers in various streets. E. A. Fisher, 14532 Lake Ave., city engr.

Tex., Austin—City, c/o W. E. Seaholm, acting city mgr., rejected bids Sept. 6, storm sewers in Kinney Ave., Virginia to Ashby Aves. J. E. Motheral, city engr. CD 9/13—ENR 9/14, under LB.

Alta., Westlock—Municipality, sewerage sys. and sewage disposal field, etc. $26,000.

B. C., Brighouse—Richmond Twp., R. C. Palmer, clk., Brighouse, exten. sewerage sys $35,000. J. C. Johnstone, Town Hall, engr.

B. C. Nelson—Municipality, storm sewers $33,000. S. H. Dawson, City Hall, engr.

Ont., Kenora—Municipality, J. McCoombs, supt. P. Wks., Town Hall, sewage treatment and disposal plant, expanding sewers $40,000.

BIDS ASKED

Bids Asked September 28

Que., Drummondville—J. Marier, city clk., sewers. $50,000. Plans deposit $5. O. Bennette, City Hall, engr.

Bids Asked October 16

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., Hall of Records, 10,400 lin. ft. 6 and 8 in. vitr. clay sanitary sewers in Exeter and other streets. C. I. 1094. Over $36,000. A. Jones, Hall of Records, engr.

LOW BIDDERS

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., Hall of Records, Sept. 13, vitr. clay sanitary sewer in Northside Dr. and other Streets, from M. Miller, 477 N. Bunker Hill Ave., $148,280. CD 6/21—ENR 8/24.

†Calif., Vacaville — City, sewer facilities from Basic Vegetable Products Co. to sewage plant, approx. 9,000 ft., Calif., 4-602-N, to M. J. Lynch, Barnevald and Oakdale Ave., San Francisco, $51,200. FWA. C. E. Bentley, 214 Pine St., San Francisco, engr. CD 4/11—ENR 4/13.

†La., New Orleans—Sewerage & Water Bd., 536 Carondelet St., sewer imprvs. for housing, La. 16-103, to American Heating & Plumbing Co., Inc., 829 Baronne St., $32,300. FWA. Fromherz Associates, Carondelet Bldg., engrs. CD 9/5—ENR 9/7.

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SEWERS, WASTE DISPOSAL (Low Bids)

N. C., Burlington—City, E. B. Hor[n], mayor, approx. 4 mi. sewer extens. to G[reen] Spruce. Greensboro, $40,055. Bids 9/[6] CD 9/6—ENR 9/7.

†**Pa., Phila.**—U. S. Eng., Penn Mut[ual] Bldg., 6 and Walnut Sts., Sept. 12, disp[osal] basin, excav., dike work, drainage di[tch] and sluice box, Hog Island, from Con[crete] Foundation Co., 215 S. 17 St., $62,070. CD [9/]

S. C., Charleston—City, installing dr[ains] and sewers various streets northwest s[ection] from Charleston Constructors, Inc., Tr[ott] St. and Adger's Wharf, $37,010. CD [9/] —ENR 9/17.

CONTRACTS AWARDED

O., Youngstown—City F. Cavalier, [Dir.] Finance, City Hall, incinerator furnaces, [to] Pittsburgh-Des Moines Steel Co., New Island, $67,010. Former bids rejected. 8/10—ENR 8/17. under LB.

BRIDGES

PROPOSED WORK

★**Pennsylvania**—Commonwealth of Pe[nn]sylvania, J. U. Shroyer, secy. H[ighways] Harrisburg, plans 2 concrete by. brid[ges] Route 140, Lebanon Co. $700,000.

Pennsylvania—Union Railroad Co., H. [C.] Sayre, ch. engr., Frick Bldg., Pittsbu[rgh] Zone 30, open deck, single track, deck g[ir]der, railroad bridge between E. Pittsbu[rgh] Boro and N. Versailles Twp., Allegheny

BIDS ASKED

Bids Asked September 28

Arkansas—J. H. Crain, chn., State [Hy.] Dpt., Little Rock, 186 ft., rein.-con. water bridge, Benton Co.; 0.206 mi. proach and one 511 ft. treated timber re con. bridge at Beaver, Carroll Co.; 0. mi. approach and one 382 ft., rein.-c structural steel bridge over Little River at Higden, Cleburne Co. CD 9/ ENR 9/14.

Pa., Pittsburgh—F. M. Roessing, dir. Wks., City County Bldg., removing w deck on approach spans and replacing w rein.-con., repairing downstream sidew on approach spans, Smithfield St. bri $30,000. H. S. Ayres, 355 City Co Bldg., city engr.

Bids Asked September 29

Minnesota—State Hy. Dpt., St. P Bridge 6379, involving erecting used 60 low truss span, together with construct two 15 ft. beam span approaches, t length 91.5 ft., and Bridge 8617, concrete culvert 31.7 ft. long, S.P. 8506-14 (Trunk 61-3) on Goodview Rd., ½ mi. west Winona. $35,000. Plans deposit $1.05. J. Miller, bridge engr.

Bids Asked October 5

California—State Div. Hys., State Bl[dg.] Los Angeles, 0.2 mi. existing timber bri with concrete deck to be raised to n grade, approaches to be graded, plant t surfacing to be placed on bituminous s facing treatment, Orange Co. G. T. McC Pub. Wks. Bldg., Sacramento, state hy. en

LOW BIDDERS

★**California**—State Div. Hys., Sacrame Sept. 13, reconstructing portion exis bridge across Sacramento River, Rio Vi Sacramento Co., from Lord & Bishop, P. Box 812, Sacramento, and A. Teichert Son, Inc., P. O. Box 1113, Sacrame

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BRIDGES (Low Bidders, Cont'd.)

$727,858; repairing 4 timber trestle bridges, San Joaquin Co., from D. Caputo, 985 Delmas Ave., San Jose, $26,319. CD 8/25—ENR 8/31.

Louisiana—State Hy. Dpt., D. Y. Smith, dir., Baton Rouge, Sept. 6, repairing East Park Ave. Bridge, (Houma), Terrebonne Parish, from Robinson & Young, Louisiana Natl. Bank Bldg., Baton Rouge, **$39,623.** CD 8/22—ENR 8/24.

Missouri—State Hy. Comn., Jefferson City, Sept. 1, two 70 ft. and one 80 ft. I-beam spans, etc., Johnson Co., from Frank Trager, Chillicothe, **$36,222.** CD 8/22—ENR 8/24.

N. Y., New Rochelle—Bd. P. Wks. Westchester Co., County Office Bldg., White Plains, Sept. 11, repairing bascule bridge and plaza, Glen Island, from Reese Tubman Corp., 11 Bway., New York, Zone 4, **$36,980.**

New Jersey—Essex and Hudson Joint Bridge Comn., Hall of Records Bldg., Newark, Sept. 7, reconstructing fenders on bridge over Passaic River, from Linde-Griffith Co., 452 Passaic St., Newark, **$30,714.** CD 9/1.

STREETS AND ROADS

BIDS ASKED

Bids Asked September 26

Ill., Joliet—B. K. Preston, supt. hys. Will Co., County Bldg., 13,800 tons 20 ft. bit. surface C-6 mod. 2,925 tons aggregate base reconditioning for Project 116-IT-MFG. Over $25,000. Plans deposit $5.

La., Lake Charles—C. W. Gabbert, secy. Calcasieu Parish Police Jury, paving ¼ mi. parish road from Maplewood St. to Access between U.S. Hy. 90 and rubber refinery plant. $30,000. John W. Harris, Associates, Lake Charles, engrs.

Bids Asked September 27

Kansas—State Hy. Dpt., Garnett, resurfacing material 20.82 mi. P. 4773, 13.361 mi. P. 4774, both Anderson Co.; 6.6 mi. P. 4768, 18.991 mi. P. 4775, 7.51 mi. P. 4777, 2.474 mi. P. 4776, 4 mi. P. 4778, all foregoing in Bourbon Co.; 4.855 mi. P. 4779, Coffey Co., 11.227 mi. P. 4780, 2.405 mi. P. 4781, both Franklin Co.; 3 mi. P. 4782, 3.019 mi. P. 4783, both Linn Co.; 19.885 mi. P. 4784, 7.572 mi. P. 4785, both Miami Co.; 6.02 mi. P. 4786 and 4.667 mi. P. 4896, both Neosho Co. R. C. Keeling, Topeka, engr.

Bids Asked September 28

N. J., Galloway—Town, 2696 White Horse Pike, Cologne, bituminous surface treating 30,380 sq. yd., prepared gravel surfacing 30,380 sq. yd. Odessa Ave. $35,000. E. Friedley, 705 N. Main St., Pleasantville, engr.

Bids Asked September 29

Georgia—State Hy. Dpt., R. G. Clay, dir., Atlanta, pebble soil base on 6 mi. Quitman-Monticello, Florida Rd., State Route 76, SAP 1543(2), Brooks Co., grading, reconstructing roadbed, surfacing 3.441 mi. Savannah-Tybee Rd., FAP 2742-A(1), Chatham Co.; grading, top soil base 5.54 mi. Sparta-Greensboro Rd., State Route 15, SAP 964-B(4), Hancock Co.; concrete traffic lane 1.117 mi. Dublin-Jeffersonville Rd., State Routes 19 and 31, FAP SN-A FAP 470-A(4), Laurens Co.; grading, surface treating 5.54 mi. Donaldsonville-Colquitt Rd., FAP 2715-B(1), Seminole and Miller Counties.

Kentucky—State Dpt. Hys., Frankfort, concrete repair (patching) 3.503 mi. The Henderson-Evansville Rd. from Henderson to Ohio River Bridge, MP-51-19-BC; 13.44 mi. Henderson-Dixon Rd. from junction with US 60, 1 mi. west of Henderson to Webster Co. line, MP-51-159-A, both Henderson Co.; 6 mi. Morganfield-Marion Rd., from Morganfield to approx. 5 mi. east of Sturgis, MP-113-167-B, Union Co.; 9.349 mi. Dixon-Henderson Rd. from Dixon to Henderson Co. line, MP-117-9-B, Webster Co.; exten. wing walls and incidentals to Loyall Municipal Bridge, SP 45-248, Harlan Co.; roadside planting 0.174 mi. London-Corbin Rd. beginning 864 ft. south south corporate limit of London and extend. along Pine Grove Cemetery, SP-63-111, Laurel Co.

Minnesota—State Hy. Dpt., St. Paul, grading S.P. 8506-13 (Trunk Hy. 61-3) between point 1.5 mi. west and 0.5 mi. east of west city limits of Winona, involving 144,982 cu. yd. excav. for roadway, dike and channel construction in reservoir, over $25,000. Plans deposit $1.45; production of mineral aggregate for traffic-bound gravel wearing course and for stockpiles for Maintenance Division, crush, screen, load and haul about 23,150 cu. yd. gravel, Mankato, over $25,000. O. L. Kipp, ch. engr.

Bids Asked October 3

La., Pineville — Town, at office R. C. Lawrence, mayor, concrete paving, necessary drainage appurtenances Oakland and Tudor Sts., sidewalks, curbs, gutters, Main st. Plans deposit $4. Pan American Engineers, 912 5 St., Alexandria, engrs.

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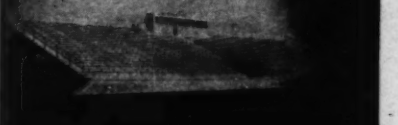

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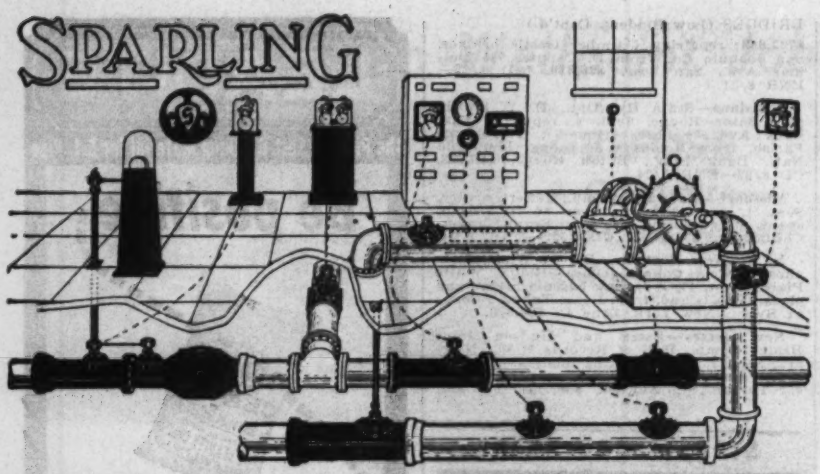

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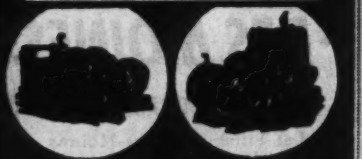

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Bids Asked October 3

Washington—State Hy. Dpt., Olympia, bituminous surface treating, 2 treated timber bridges and 3 untreated pile, detour bridges on 5.709 mi. Secondary Hy. 12-A in Aberdeen, Grays Harbor ballasting, surfacing, stockpiling materials on State Hys. 12-D and Cowlitz and Wahkiakum Counties. deposit $2. B. Bantz, hy. dir.

Bids Asked October 4

New York—H. A. Cohen, dir. Bureau tracts & Accounts, State Dpt. P. Albany, gravel double surface treating mi. hy. Orange Co. Plans deposit $10. Sells, supt. P. Wks., Albany; adv. 9/21.

Bids Asked After November 7

S. C., Charleston—City, curbing in western sect. city. Bids 8/31 rejected. 9/6—ENR 9/14, under LB.

Bids Asked

Kansas—State Hy. Dpt., Ottawa, bids Sept. 1, resurfacing material Prof. 4768. CD 8/22—ENR 8/24.

Minn., Rochester—State Hy. Dpt., Paul, rejected bids Aug. 25, crushed surfacing, crush screen, load and haul 32,508 cu. yd. traffic bound crushed wearing course, $35,000. O. L. Kipp, owner, ch. engr. CD 8/9—ENR 8/17.

Tex., Greta—Humble Pipe Line Co., Corp Christi, at office P. G. Young, engr., Houses, Refugio, soon lets contract gradi drainage structures, flex base (caliche) single asphalt surface course, Lamb Ranch, near here.

LOW BIDDERS

†**California**—Pub. Roads Admin., Phel Bldg., San Francisco, Sept. 12, 6.747 mi. cese road to Alameda Naval Air Stati Calif. DA-NR 73(1), Alameda Co., fr Louis Biasotti & Son, 40 West Clay Stockton, $80,760. C. C. Norris, Phelan Bld dist. engr.

California—State Div. Hys., Sacrame Sept. 13, imprv. 5.4 mi. Kern Co., from Cl W. Wood, Inc., $16 W. 5 St., Los Angel $108,970. CD 8/25—ENR 8/31.

Calif., San Jose—Supervs. Santa Clara C Court House, San Jose, imprv. San Jos Stevens Creek Rd. and Mtn. View-Steve Creek Rd. from Grand to San Jose-Steve Creek Rds., in Supervisor Dist. 5, from A. Raisch, 900 West San Carlos St., $79,585 $40,825 respectively.

Ill., Highwood—J. Ugolini, city clk., C Hall, Sept. 8, concrete paving 5,560 sq. y etc. Sect. 6-CS, from Eric Bolander Const Co., Winchester Rd., Libertyville, $35,5 Est. $25,000. James Anderson Co., 290 Deerpath St., Lake Forest, engr.

Ill., Wheaton—DuPage Co., County Bld Sept. 5, imprv. 8.3968 mi. road, from Arro Petroleum Co., 7419 Franklin St., Fore Park, $32,880. CD 8/29—ENR 8/31.

Indiana—State Hy. Comm., S. C. Hadde chn., Indianapolis, Sept. 12, imprv. 2.62 m Johnson Co., from Middle West Roads Co Noblesville, $48,445. Est. $53,731. CD 9/ —ENR 9/7.

Kentucky—Dpt. Hys., Frankfort, Sept. imprv. 11.722 mi. Adair Co., and 16.345 m Green and Metcalfe Counties, from Cumber land Constr. Co., Burkesville, $79,133 an $104,981 respectively. CD 8/29—ENR 8/

Mass., Boston—Dpt. P. Wks., City Ha Sept. 11, bit. concrete paving Arcadia St Dorchester from National Contg. Co., Inc 110 Washington St., Somerville, $54,744.

Michigan—State Hy. Dpt., Lansing, Sep 15, concrete pavement widening approx. 1 mi. Ford Rd., east of Schaefer Hy., fro Schaefer to Reuter Rd., SN-83-1260-1 o M-153 Wayne Co., from Julius Porath Sons Co., 702 Transportation Bldg., Detroi $28,414; approx. 1 mi. Gratiot Ave., U.S. between 3 and 9 Mile Rds., SM-50-27C- Macomb Co., from Denton Constr. Co., 170 General Motors Bldg., Detroit, $43,3 CD 9/6.

★**Ohio**—State Hy. Dpt., Columbus, Sept. 1 imprv. 0.407 mi. Scioto Co., from Fran Bros., Box 37, Sidney, $100,000***1.4 m Williams Co., from S. E. Johnson Co., 1 Terminal Bldg., Toledo, Zone 2, $34,530** 2.443 mi. Berry Co., from Brewer & Brew Sons, 81 W. Water St., Chillicothe, $41,7 est. $41,500***2.033 mi. Franklin Co., fro R. J. Dienst 297 S. High St., Columbu $54,600, est. $58,430***2.674 mi. Ashtabul Co., from Koski Const. Co., National Ban Bldg., Ashtabula, $68,530, est. $68,530** 1.237 mi. Trumbull Co. from Ohio Roa Improvement Co., 30 E. Broad St., Columbu Zone 15, $86,118, est. $26,500***34.014 m Paulding and Defiance Counties, from J. W Harper, Napoleon, $81,472, est. $65,500** 7.929 mi. Lorain Co., from Ohio Engineeri Co., Lorain, $77,880, est. $105,000***2.002 m Guernsey and Noble Counties, from Fento Const. Co., Box 445, Ashland, $30,289, e $41,200***30.06 mi. Butler and Hamilt Counties, from Walter L. Follmer Co., P. O Box 173, Hamilton, $60,623, est. $60,963** 0.463 mi. Warren Co., from O'Connell Sweeney, Inc., Kellogg and Tennyson St Cincinnati, $16,663. Received no bids Sep 12, imprv. 5.345, Muskingum Co., 0.987 m Clinton Co., 0.522 mi. Champaign Co., 1.0 mi. Allen Co. CD 8/31—ENR 9/7.

The four Hemispheroids in the large view at the top of this page are located at an oil recycling plant in the Southwest. Two of them have a capacity of 10,000 bbls. each and the other two hold 20,000 bbls. each. They are all designed to operate at 5 lbs. per sq. in. pressure. The cone-bottom bin in the illustration directly above is used to store 5,000 cu. ft. of dry lime at a Southern paper mill.

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eland 15.....2201 Guildhall Bldg.	Birmingham 1.....1520 North Fiftieth Street	San Francisco 5.....1020 Rialto Bldg.	

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SALES AND SERVICE AGENCIES IN PRINCIPAL CITIES

STREETS AND ROADS (Low Bidders Contd.)

Pa., Pittsburgh—City, Dpt. P. Wks., F. Roessing, dir., City County Bldg., appr. 120,000 sq. asphaltic surface course resurfacing approx. 120,000 sq. yd. from Allegheny Asphalt & Paving Co., 411 Blvd. of Allies, $155,285. C. H. Barrett, City County Bldg., city engr.

Pennsylvania — State Dpt. Hys., Harrisburg, Sept. 12, imprv. 0.69 mi. Northumberland Co., from F. M. Rhoades, Jr., Reading, $39,739; 0.82 mi. Indiana Co., from Charles Engelman trading as Engelman Exc. Co., Rochester Mills, $117,170. CD 9/5—ENR 9/

★ **Texas**—State Hy. Dpt., Austin, Sept. 1, imprv. 8.402 mi. Nacogdoches Co., from Texas Bitulithic Co., Box 5297, Dallas, and Ben Sira & Co., 3901 Elm St., Dallas, $4[illegible] 557***6.931 mi. Wise and Tarrant Counties from Austin Road Co., 1813 Clarence St., Dallas, $305,231***13.595 mi. Corryell and Bell Counties, from Public Constr. Co., Denton, $172,578***7.528 mi. Freestone Co., from McKinney Constr. Co., Marshall, $[illegible] 513***10.621 mi. Harris Co., from Gulf Bitulithic Co., Box 2096, Houston, $145,[illegible] CD 9/6.

Virginia—Dpt. Hys., Richmond, Sept. 1, imprv. 0.203 mi. Shenandoah Co., from Echols Bros., Inc., Staunton, $53,261. [illegible] 9/7.

CONTRACTS AWARDED

Miss., Greenville—City, E. M. Gray, mayor, paving parts Alexander, Eucha, Cedar, Allister, Gulf and Lotus Sts., to Burdine Constr. Co., Greenville, $68,373. Bids [illegible] CD 8/16—ENR 8/24.

New Mexico—At office F. G. Healy, state Hy. engr., Santa Fe, imprv. 40.7 mi. San Miguel Co., to Hayner & Burn, Las Cruces, $42,284. Bids 9/15. CD 9/6.

Oklahoma—State Hy. Dpt., Oklahoma City, grading, concrete paving 20.034 mi. Comanche Blvd. Rd. from city limits of Lawton, north to Fort Sill Reservation, Comanche Co., to Standard Paving Co., 2119 E. 11 St., Tulsa, $149,907. Est. $139,826. Bids 9/7, awarded 9/12. H. E. Baily, Oklahoma City engr.

†**Oregon**—Public Rds. Admin., 316 New Post Office Bldg., Portland, construct Deadwood timber access road in Ashland-Medford Area, Jackson Co., to Morrison-Knudsen Co., 319 Bway., Boise, Idaho, $[illegible] 783. Awarded 9/12.

Oregon—State Hy. Comn., Salem, 12,600 cu. yd. crushed gravel in stockpiles Nimrod-Alder Springs Rock production project, McKenzie Hy., Lane Co., to Newport, Kelly & Kibbe, 7031 N. E. Halsey St., Portland, $30,600. Bids and awarded 9/11.

†**Ore., Portland**—U. S. Eng., 628 Pittock Block, SW 10 Ave. and Washington St., Portland, access road and appurtenant work at Portland sub-port of embarkation, to Parker-Schramm, 516 Couch Bldg., $29,[illegible] Awarded 9/8.

Tex., Houston—City, asphalt paving Brinkhurst, Bear and Center Sts., to Brown & Root, Box 3, $34,465. F. Harrell, asst. city engr.

Wyoming—State Hy. Dpt., Cheyenne, imprv. 1.539 mi. Sheridan Co., to Big Horn Constr. Co., Sheridan, $49,242. Bids [illegible] awarded 9/12. CD 9/1.

EARTHWORK, WATERWAYS

PROPOSED WORK

†**Idaho**—U. S. Eng., 628 Pittock Block, S.W. 10 Ave. and Washington St., Portland, Ore., flood control work along Snake River, $100,000; along Boise River, $200,000.

Wash., Bellingham—Port of Bellingham, 300 ft. stone breakwater exten. $50,000.

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EARTHWORK, WATERWAYS (Cont'd.)

Bids Asked September 29

†Tenn., Memphis—U. S. Eng., P. O. Box 97, Zone 1, approx. 1,275 lin. ft. pile dike in Mississippi River at Vice President's Island, approx. 730 mi. above Head of Passes, near here.

Bids Asked September 30

†Montana—Bureau Reclamation, Dpt. Interior, Fairfield, constructing Sun River crossing, Pishkun Canal, Station 40 plus 12, Sun River Project, 18 mi. northwest of Augusta, Spec. 1771-D. W. R. Young, acting ch. engr.

Bids Asked October 6

†Neb., Hemingford — At office, Bureau Reclamation, Dpt. Interior, W. R. Young, acting ch. engr., Denver, Colo., furnishing, del. in stockpiles approx. 1,450 tons sand and 2,300 tons coarse aggregate for Box Butte Dam, Mirage Flats Project, Spec. 1773-D.

Bids Asked October 7

†Oregon-Idaho—Bureau Reclamation, Dpt. Interior, W. R. Young, acting ch. engr., Boise, Idaho, sealed asphaltic-concrete lining North Canal, station 2252 plus 82 to station 2302 plus 82, North Canal lateral 43.2, station 0 plus 50 to station 10 plus 50, Dead Ox Flat Div., Owyhee Project, Oregon and Idaho, near Ontario, Ore., Spec. No. 1768-D.

Bids Asked October 10

†Arizona—Bureau Reclamation, Federal Bldg., farm laterals and land leveling, Yuma Mesa predevelopment, Yuma Mesa Div., Gila Proj., Spec. 1°72-D. W. R. Young, acting ch. engr.

Bids Asked October 13

†New Mexico—Bureau Reclamation, Dpt. Interior, W. R. Young, acting ch. engr., Denver, Colo., furnishing, del. f.o.b. cars at shipping point or f.o.b. cars Tucumcari, one 16 ft. x 9 ft. and one 12 ft. x 9 ft. radial gates with rollers, pin-bearings, wall plates, and accessories for both gates, with one 8 in. gate sill for 12 x 9 ft. gate only, two 5,000 lb. cap., manually operated, radial-gate hoists, complete with accessories for installation in check and wasteway in Conchas Canal, at Station 812 plus 57, Tucumcari Project, Spec. 1770-D.

Bids Asked October 14

†Oregon—Bureau Reclamation, Dpt. Interior, W. R. Young, acting ch. engr., Bend, earthwork, structures, county bridges at stations 130 plus 42, 1332 plus 00, and 1411 plus 10, operating bridge at station 1315 plus 00, and farm flumes at stations 130 plus 95 and 1332 plus 30, North Unit Main Canal, Deschutes Project, near Bend, Redmond and Terrebone, Spec. No. 1769-D.

LOW BIDDERS

Illinois—Illinois Div. Waterways, 201 W. Monroe St., Springfield, Sept. 14, rein.-con. trash rack with all necessary appurtenances in main drainage ditch of Hillview Drainage and Levee Dist., Hillview, Green and Scott Counties, from Sangamo Constr. Co., 700 N. MacArthur St., Springfield, $37,435.

Ill., Peoria—Greater Peoria Sanitary & Sewage Disposal Dist., foot of Darst St., Sept. 12, raising, strengthening earth levee for constructing riprap stone paving, etc., from Herkel & Day, West Chicago, $30,878. CD 8/8—ENR 8/10.

†Louisiana—U. S. Eng., foot of Prytania St., Sept. 9, approx. 1,500,000 cu.yd. compacted earthwork, etc., Item R 278.7, Morganza Levee, Atchafalaya Levee Dist., Pointe Coupee Parish, Mississippi River Levees, Solic. No. 16-047-45-9; from McWilliams Dredging Co., Hibernia Bldg., New Orleans, hydraulic method 25.91c. per cu.yd. CD 8/31.

†La., New Orleans — U. S. Eng., foot of Prytania St., 6,680 squares 100 sq. ft., asphalt or concrete levee slope paving work, excav., etc., Sol. No. 16-047-45-7, from T. W. Kleinpeter, 4047 Hatcher Dr., $130,840.

†Massachusetts and New Hampshire—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., Sept. 9, exploratory borings at Charlton and West Brookfield, Mass., and Honey Hill and North Canaan, N. H., from Sprague & Henwood, Inc., Box 446, Scranton, Pa., $18,920.

O., Cleveland—City, City Hall, Sept. 8, bulkhead, jetties along Lake Erie at W. 103 St., near Edgewater Beach, from R. W. Walton, 1357 West Blvd., $110,400. CD 8/29—ENR 8/31.

†Washington—Bureau Reclamation, S. O. Harper, ch. engr., Denver, Colo., Sept. 7, furnishing 2-leaf miter gate for drydock at Grand Coulee Dam, from Lehigh Structural Steel Co., Lehigh, Pa., $48,900. CD 8/14—ENR 8/17.

CONTRACTS AWARDED

†Louisiana—U. S. Eng., foot of Prytania St., New Orleans, approx. 72,500 cu. yd. earthwork on Mississippi River Levee, Solic. No. 16-047-45-6, Jefferson and Plaquemines Parishes, to J. P. Cross, Abbeville, $47,125. Bids 8/29. CD 8/16.

★**†Michigan**—U. S. Eng., P. O. Box 2859, 700 Union Guardian Bldg., Detroit, Zone 31, retaining wall at Sault Ste. Marie Lock, to Sunswick Corp., 10 E. 40 St., New York, N. Y. Est. $1,000,000. Bids 9/11.

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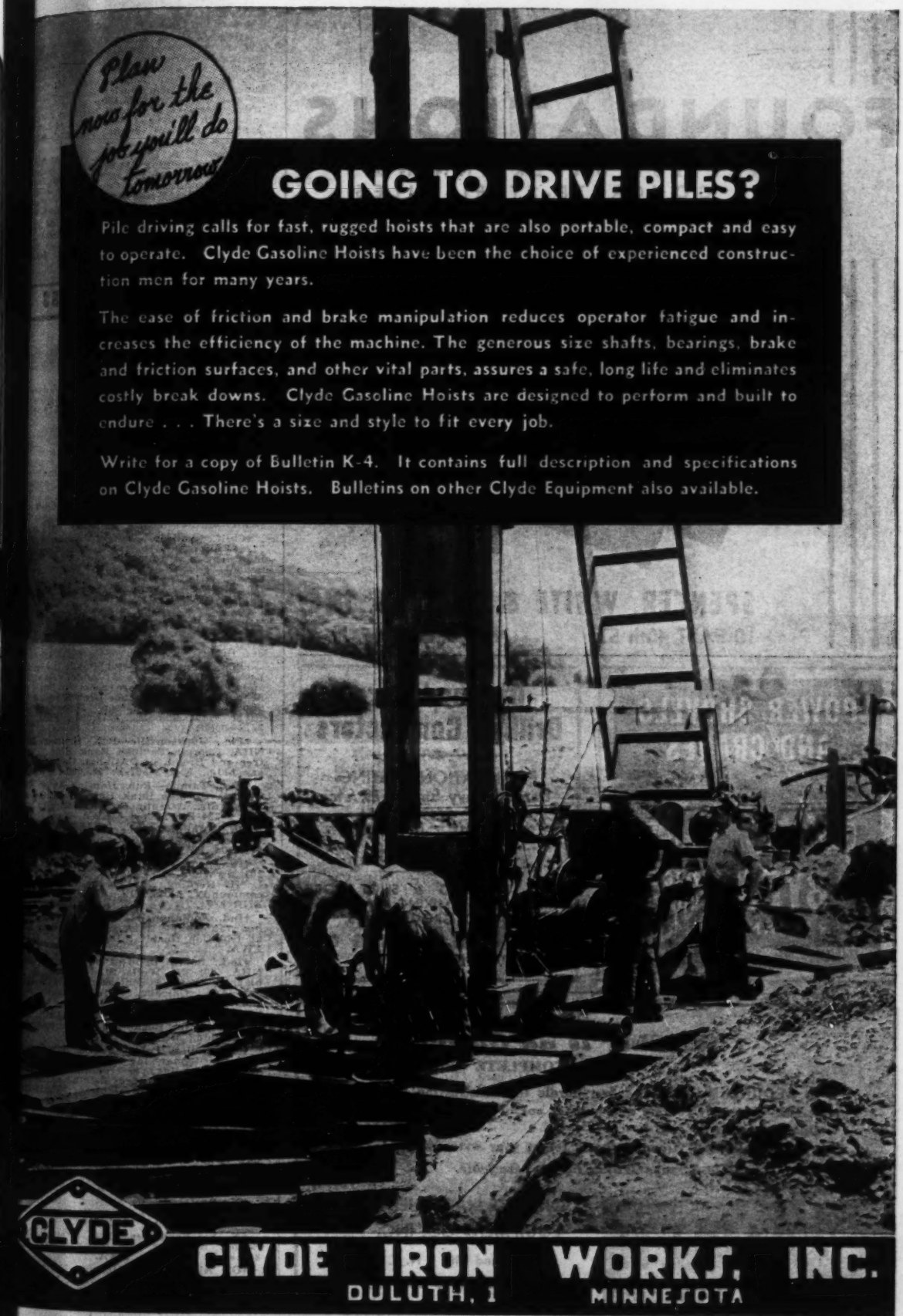

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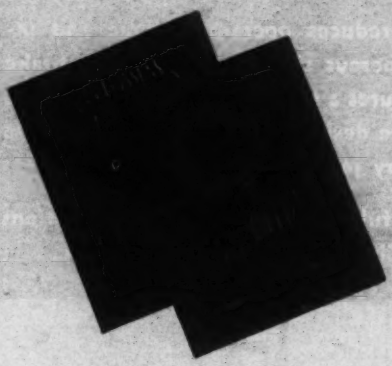

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BRANCH WAREHOUSE—Gary, Ind.

EARTHWORK, WATERWAYS (Contra
Awarded, Cont'd.)

†**Oregon**—U. S. Eng., 628 Pittock Blo
S.W. 10 Ave. and Washington St., Portla
revetment work along Willamette and K
Kenzie Rivers in locations A, F, G and
(Inv. 986), near Eugene and Harrisbu
Lane Co., to Oscar Butler & Son, 4919 N
42 St., Portland, $63,130; along Santi
River, locations L and M, between Jeffer
and mouth of river, Jefferson Co., to Leon
& Slate, 7304 S.W. 40 St., Portland, $44,1
Awarded 9/8.

†**Texas**—U. S. Eng., 25 St. and Avenue
Galveston, dredging 484,000 cu. yd. materi
for distance 18,200 lin. ft. from Cedar Bay
Chambers and Harris Counties, to Jahn
Service, Inc., 814 Howard Ave., New Orlea
La., 6.17c. per cu. yd. CD 9/12—ENR 9/
†**Tex., Athens**—U. S. Eng., 231 W. M
St., Denison, 230,000 cu.yd. embankme
gates, pipe, etc., Sol. 41-242-45-18, to Sp
cer Constr. Co., Carrpliton, approx. $46,6
CD 8/15.

PUBLIC BUILDINGS

PROPOSED WORK

†**Calif., Azusa**—Aerojet Engineering Co
Pasadena, addnl. plant bldgs. $55,000. D
fense Plant Corp. will finance.

†**Calif., Martinez**—Federal Works Agen
2223 Fulton St., Berkeley, Zone 1, reje
bids Aug. 30, nursery school. Calif. 4-607
CD 8/18.

★†**Calif., Richmond**—Housing Auth.
City of Richmond, C. F. Strothoff, ex
dir., Commercial and Ohio Sts., remodel
and fire-safing 10,000 U. S. Maritime ho
ing units and 19 dormitory bldgs., in Cutt
Blvd., Ohio and Commercial Sts. proje
$1,315,000. CD 4/14—ENR 4/20.

†**Calif., San Diego**—Pub. Housing Au
NHA, 785 Market St., San Francisco, 3
family trailers, Calif. 4884.

†**Calif., Vallejo**—Federal Works Agen
2223 Fulton St., Berkeley, Zone 1, reje
bids Sept. 8, 4 nursery schools, 2 at Flos
School, 1 each at Solano and Carquin
Schools, Calif. 4-632-F. Will readvert
D. H. Horn, Claremont Hotel, Berkel
archt. CD 8/22—ENR 8/24.

†**Conn., Fairfield**—Pub. Housing Au
NHA, 24 School St., Boston, Mass., sew
disposal plant, Melville Ave. Proj., Co
6071. Fletcher Thompson, Inc., 211 St
St., Bridgeport, engr.

†**Fla., Jacksonville**—Bd. Public Instructi
Duval Co., bids soon 31 addnl. classroo
and 1 general purpose room to Duval C
School bldgs. at Fletcher High School, Nor
Shore, Thomas Jefferson, Wescomett a
River View Schools. $278,000. FWA.
8/18—ENR 8/24.

†**Fla., Jacksonville**—Pub. Housing Au
NHA, Georgia Savings Bank Bldg., Peac
tree and Broad Sts., Atlanta, Ga., war nu
ery bldg., Fla. 8-327-F. $35,000. FWA.

†**Fla., Tampa**—Pub. Housing Auth., NH
Georgia Savings Bank Bldg., Peachtree a
Broad Sts., Atlanta, Ga., war nursery bld
Fla. 8-324-F. $46,000. FWA.

†**Ill., Moline**—Lutheran Hospital, $46
Ave., 1 story, laundry addn., Ill. 11-326
$41,400. FWA.

†**Ill., Seneca**—Pub. Housing Auth., NH
201 N. Wells St., Chicago, Zone 6, plans
L. H. Gerding, 708 La Salle St., Otta
community bldg., Ill. 11216. CD 8/3
ENR 9/7.

†**Ind., Indianapolis**—City, altering, repa
ing, remodeling 3 separate adjacent bld
at Isolation Hospital Ind. 12-219-N. $93,9
FWA.

†**Ind., South Bend**—Pub. Housing Au
NHA, 201 N. Wells St., Chicago, 6, I
plans by Loebl & Schlossman, 333 N. Mic
gan Ave., Chicago, Ill., community Bld
Ind. 12188.

†**Me., Portland**—Pub. Housing Auth., NH
24 School St., Boston, 8, Mass., commun
bldg. addn., Me. 17033.

†**Md., Sollers Point**—Comrs. Baltimore C
Towson, dismantling, moving from Dub
Va., remodeling, re-erecting here, fra
dormitory bldg. to provide war nursery c
ter for 97 preschool children, Md. 13-22
$37,000. FWA.

†**Mass., Canton**—Plymouth Rubber C
Inc., Canton, addnl. plant facilities. $150,0
Defense Plant Corp. will finance.

†**Mass., South Boston (sta. Boston)**—C
ney Hospital, Old Harbor, 1 story bldg.
house science and dietetic laboratories
nurse's training, at Carney Hospital. Ma
19-195-N. $17,840. FWA.

†**N. J., Dover**—U. S. Eng., 120 Wall S
New York, 5, N. Y., 7 miscellaneous bld
Picatinny Arsenal. $200,000.

†**N. Y., Rochester**—City, altering, imp
School Bldg. 13, for war nursery, N.
30-288-N. $13,800. FWA.

†**O., Akron**—Pub. Housing Auth., NH
2073 E. 9 St., Cleveland, Zone 14, plans
E. D. Wagner, 200 Permanent Bldg.,
unit single person housing, Ohio 23
CD 8/24—ENR 8/31.

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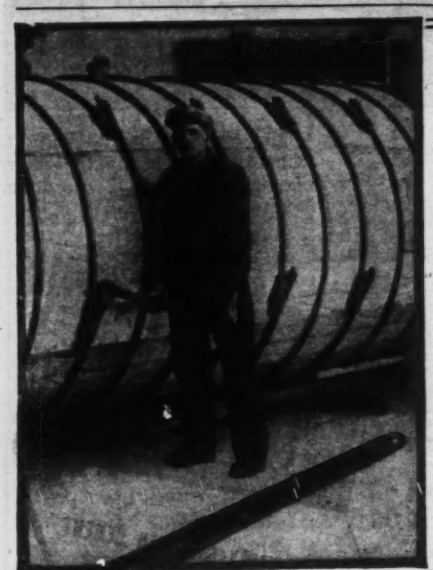

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PUBLIC BUILDINGS (Proposed W... Cont'd.)

O., Damascus—Goshen Bd. Educ., H. Stanley, clk., bond election Nov. 7, h... and grade school addn. $150,000. ... Kling, 100 E. Rayne St., Youngstown, ar...

Ore., Klamath Falls—City of Klam... Falls and Klamath Co., plans by H. Per... 1121 Main St., 1 story, rein.-con. Joint C... County jail. $160,000. Applied to F... C. E. Stewart, Spalding Bldg., Portla... engr.

Ore., Roseburg—Mercy Hospital, Rose... plans by F. B. Jacobberger, McMay Bl... Portland, Mercy Hospital addn. $15... Applied to FWA.

★**†Pa., Bruceton**—Bureau of Mines, H... Greenwald, constr. supt., 4800 Forbes ... Pittsburgh, preliminary sketches by Fr... & Prack, engrs.-archts., 517 Martin Bl... Pittsburgh, reinforced steel research ... development laboratory for synthetic liq... fuels. $1,500,000. CD 9/15.

Pa., Morrisville—Commonwealth of Pe... sylvania, c/o A. J. Warlow, Harrisb... plans by Del. River Nav. Com., Morrisv... cement brick maritime academy. $150,0...

Pa., Pottsville—Pottsville Hospital, Ma... Chunk and Jackson Sts., plans by T. ... Ellerbe, 1st Natl. Bank, St. Paul, Mi... hospital addn.

†Tenn., Columbia—Pub. Housing Au... NHA, Georgia Savings Bank Bldg., Pea... tree, and Broad Sts., Atlanta, 3, Ga., ... homes. $150,000.

†Tex., McCregor—Pub. Housing Au... NHA, 1205 Electric Bldg., 7 and Taylor S... Fort Worth, Zone 2, plans by Clarke ... Pelich, Geren & Rady, Insurance Bldg., F... Worth, 125 portable shelter units, Tex. 41... CD 9/6—ENR 9/14.

Tex., Sweeney—Ind. School Dist. ... Sweeney, plans by A. B. Dow, Inc., ... Commerce Bldg., Houston, 1 story, br... rein.-con. school. $150,000.

†Wash., Auburn—Auburn School Dist. ... King Co., Unit 1, Junior High School ad... and Unit 2, school, Wash. 45-302-N. $138,... FWA.

★**Alta., Edmonton**—Dpt. P. Wks., Ottaw... Ont., plans by MacDonald & Magoon, ... Tegler Bldg., 5 story, bsmnt., granite, st... federal bldg., 100 St. $500,000.

★**New Brunswick**—Dominion Govt., Ottaw... Ont., plans by Veterans Rehabilitat... Dpt., Dpt. Pensions & National Hea... Ottawa, Ont., 200 homes. $900,000.

BIDS ASKED

Bids Asked After September 15

†N. Y., Syracuse—Bd. Trustees Syra... University, laboratory and classroom bl... N. Y. 30-284-N. $50,000. FWA. Egger... Higgins, 542 5 Ave., New York, Zone ... archts. CD 7/11—ENR 7/13.

Va., Williamsburg — Supt. Bldgs. ... Grounds, College of William & Mary, W... liamsburg, heat distr. sys. $200,000. W... & Wilson, Peoples Bank Bldg., Lynchb... archts.

Bids Asked After September 19

†Md., Cumberland—Allegheny Hospi... cadet nurses' dormitory, classroom bl... FWA. S. Russ Minter, 1st Natl. Ba... Bldg., archt.

Bids Asked September 27

†Kan., Kansas City—Douglas Hospital, ... F. E. Kitchen, supt., 27 and Grant St., ... modeling hospital, Kan. 14-254. $160,0... FWA. Bloomgarten & Frohwerk, 612 ... delity Bldg., 9 and Walnut Sts., Kan... City, Mo., archts. CD 9/6—ENR 9/14.

Bids Asked September 28

†Wash., Vancouver—Clark County Sch... Bd., 23 and Kauffman Sts., Fourth Pla... School, No. Wash. 45-290-N. FWA. Pl... deposit $25. D. Steward, 122 Central Bl... archt. CD 9/11.

Bids Asked October 3

Ind., Gary—Mrs. Frankie Helman, trus... Calument Twp., Lake County Court Hou... 401 Bway., 1 story, bsmnt., concrete blo... rein.-con. Junior High School. $150,0... Plans deposit $20. J. H. Wildermuth, ... Bway., archt. CD 7/6—ENR 7/13.

Bids Asked October 3

†Ga., Columbus—City of Columbus Ho... ing Auth., 1100 27 St., 160 family dwell... units and community bldgs., for War ... Williams homes, Ga. 4-5, for NHA. Pl... deposit $50. Lockwood & Biggers, Mur... Bldg., archts. CD 4/10—ENR 4/13.

Bids Asked October 3

†Ga., Savannah—Pub. Bldgs. Admin., ... and F Sts. N.W., Wash., 25, D. C., exter... painting and miscellaneous repairs, U. ... Post Office & Court House.

Bids Asked October 6

†Ga., Marietta—Pub. Bldgs. Admin., ... and F Sts. N.W., Wash., 25, D. C., sch... bldg., Ga. 9-302-F. FWA. Tentative de... R. R. Nash, Moxely Bldg., archt. CD 9/1... ENR 11/14.

Bids Asked October 10

†Kan., Kansas City—Providence Hospi... 13 and Tauromee Sts., c/o Sisters of Char... Mother M. Francesca, pres., 13 and Tau... mee Sts., hospital expansion, Kan. 14-2... $275,000. FWA. Carroll & Dean, 1220 R. ... Long Bldg., Kansas City, Mo., archts. ... 9/6—ENR 9/14.

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PUBIC BUILDINGS (Bids Asked, Cont'd

Bids Asked About October 16

†Fla., Panama City—City, constructing bed hospital. $400,000. FWA. Smith Gillespie, Packard Bldg., Jacksonville, Za 2, engrs.

Bids Asked

†Md., Aberdeen Proving Ground—U. Eng., Standard Oil Bldg., Baltimore, story, X-ray bldg., brick, concrete.

LOW BIDDERS

†Calif., San Diego—Pub. Bldgs. Admi 18 and F Sts. N.W., Wash., 25, D. C. Se 15, Barnard School, Calif. 4-585-3, and M way School, Calif. 4-584-2, from Shuman & Evans Constr. Co., 3000 N. Central Av Phoenix, Ariz., $166,666 and $194,642 respe tively; Frontier School, Calif. 4-584-1, fr J. Keith, 8517 W. 3 St., Los Angeles, $175,8 Bids 8/29 rejected. CD 8/31—ENR 9 under LB.

†D. C., Wash.—Pub. Bldgs. Admin., 18 F Sts. N.W., Zone 25, Sept. 15, dormitory Langston Stadium, D.C. 49102, from Jo McShain, Inc., 16 St. N. and N. Arling Bridge, Arlington, Va., $348,200. CD 9/1

†D. C., Wash.—Yards & Docks, Navy De 18 St. and Constitution Ave. N.W., Zone Sept. 11, explosives bldg., Naval Resear Laboratory, NOY 10455, from John Tester Son, Inc., 1427 I St. N.W., $49,548. CD

†N. J., Somerville—Somerset Hospi Rehill Ave., Sept. 12, hospital addn., N 23-177-N, from J. N. Wester, 320 Am Ave., Metuchen, $415,659. FWA. CD 9/ ENR, 9/7.

★**†Wis., Merrimac**—U. S. Eng., 408 Fede Bldg., Milwaukee, Sept. 7, barricades Badger Ordnance Plant, from Graham P ing & Constr. Co., 30 N. La Salle St., Chica Ill., $645,838; Sept. 11, flooring at sh plant, from Melville Corp., 737 N. Michig Ave., Chicago, Ill., $69,241. Hercules Pow Co., 908 Market St., Wilmington, Del., operate. Mason & Hanger Co., 500 5 Av New York, N. Y., engrs.-archts.

B. C., Vancouver—Provincial Govt., V toria, 2 story, part bsmnt., 35x228 ft., re con. hospital, from Coast Constr. Co., L 704 Standard Bank Bldg., $141,378. Whittaker, Parliament Bldgs., Victo archt.

CONTRACTS AWARDED

Mich., Bay City—Bay City General Hos tal, general contract, brick, steel, concr hospital addns., alterations, to Engelh Constr. Co., 404 Shearer Bldg., appr $150,000. Bids 8/15. CD 8/7—ENR 8/1

†Mich., Detroit—Westinghouse Electric Mfg. Co., Detroit, Naval Ordnance Pla 23500 Mound Rd., brick, steel, concrete pl addn., to Bryant & Detwiler Co., 2304 Pen scot Bldg. Est. approx. $100,000. Federa financed. Albert Kahn Associated Arc tects and Engineers, Inc., 345 New Cen Bldg., Detroit, 2, archts.

★**†Va., Williamsburg**—Yards & Doc Navy Dpt., 18 St. and Constitution A N.W., Wash., 25, D. C., storehouse, shed storage bldg., Naval Supply Depot, Cheath Annex, NOY 9708, to Virginia Engrg. Inc., Melson Bldg., Newport News, $3,47 Bids 9/7. CD 9/11—ENR 8/10, under LB

Ont., Sarnia—Wartime Housing, Ltd., York St., Toronto, 50 soldiers' houses, Russell Const. Co., Ltd., 501 Harbour C missioners Bldg., Toronto, about $13 $175,000. CD 9/6.

★**Ont., Sarnia**—Wartime Housing, Ltd., York St., Toronto, 200 houses on ext sion of Cromwell St. from Russell to E Sts., to L. C. Scott Const. Co., Ltd., Bay St., Toronto, about $700,000. CD 6/ ENR 7/8.

Que., Hull—Wartime Housing, Ltd., Yonge St., Toronto, Ont., 50 addnl. hous to Clark-Francis, Ltd., Whitewood Av New Liskeard, Ont., about $175,000. CD —ENR 7/13.

Que., Mont Louis—Province of Que Quebec City, cold storage warehouse, to Giroux, 7 Notre Dame St., St. Casmir $40,000. Dpt. Game & Fisheries, Quebec C archts. CD 8/10.

Que., St. Bonaventure—Province of Q bec, Quebec City, cold storage warehou to A. Bugold, Rue Principale, Rutm Blanc, Est. $40,000. Dpt. Game & Fisher Quebec City, archts.

COMMERCIAL BUILDIN

PROPOSED WORK

Ind., Indianapolis—Hall-Hottel Co., I E. Ohio St., plans by L. F. Ayres, en archt., Architects and Builders Bldg., gr 2 apartment brick dwellings. $175,000.

★**O., Cleveland**—Mt. Sinai Hospital, H. L. Rockwell, dir., 1800 E. 105 St., story, brick, rein.-con. hospital ad $500,000.

O., Cleveland Heights—A. J. Hum 4091 Meadowbrook Blvd., Cleveland, rev plans by Wm. J. Bingham, Chillicothe R Kirtland, 3 story, bsmnt., 30x185 ft., br apartment. $150,000. CD 10/25—E 10/28, under CA.

A. C. Airplane Repair Shop, Brookley Field, Mobile, Ala.

Stadium, Duke University, Durham, N. C.

Second Avenue Bridge over Miami River, Miami, Fla.

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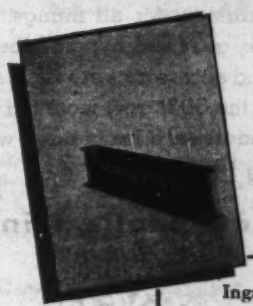

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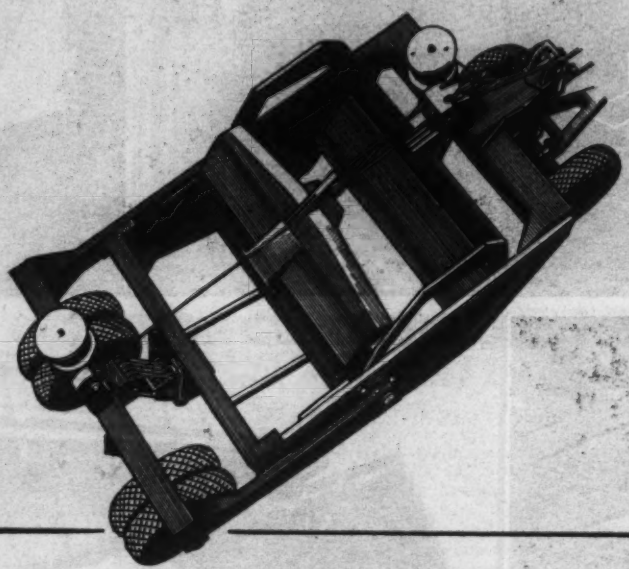

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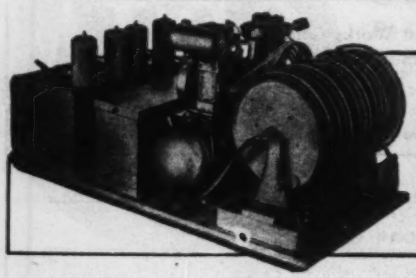

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COMMERCIAL BLDGS. (Proposed W... Cont'd.)

★**Ont., Ottawa**—Recreational Assn. of ... tawa, c/o M. E. Kenny, R. A. ... Rideau St., preparing plans, theatre, ... $740,000; outdoor swimming pool center, ... 000; indoor sports centre, incl. gymnasi... basketball, badminton, tennis accomodati... etc., $280,000; outdoor sports centre, ... athletic field for track, etc., stadium, ... Ottawa West, $170,000.

Que., Montreal—Reverend Sisters of Ch... ity (Grey Nuns) 197 Ste. Catherine St. ... Ophtalmique Hospital. $150,000.

CONTRACTS AWARDED

★**N. J. Union**—Consolidated Const. Co., ... Pomona Ave., Newark, 2 story, fra... brick veneer garden apartment, Magie A... near Galloping Hill Rd., separate contra... $500,000. McMurray & Schmidlin, 961 Se... vesant Ave., archts. CD 8/8—ENR 8/1...

La., New Orleans — International Ho... New Orleans, altering bldg. Camp ... Gravier Sts., to G. F. Favrot, Baltzer Bl... $170,486. CD 8/16—ENR 8/24.

Pa., New Kensington—Citizens Gen... Hospital, L. C. French, supt., New Kens... ton, 1½ story, 63x68 ft., brick, concr... rein.-con. boiler house and laundry bldg., ... Helvenston Const. Co., 4828 Liberty A... P. O. Box 9003, Pittsburgh, Zone ... $60,750. Bids 9/11. CD 8/31—ENR 9/7.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ark., Lake Village—SUB-STATION—... kansas Power & Light Co., Pine Bluff, ... station. $100,000.

Colo., Denver — PLANT — Union Pa... System, B. H. Prater, ch. engr., 1416 D... St., Omaha, Neb., soon lets contract 1 st... 143x160 ft. hollow tile or brick plant. $45... Roland L. Linder, Insurance Bldg., ar... B. K. Sweeney Electrical Co., 1601 23... lessee. CD 8/15—ENR 8/17.

N. J., Hillside—PLANT—Electric Fixt... Mfg. Co., 2 Garden St., Newark, plans ... Wm. Lehman, 972 Broad St., Newark, ... story, brick, mfg. bldg., Chestnut St. $42...

Ind., Whiteland — CANNERY — Stok... Bros. & Co., Merchants Bank Bldg., I... anapolis, rebuilding cannery. $60,000 ... more with equip.

Kan., Independence—COMPRESSOR ST... TION—Cities Service Gas Co., Southeas... City, Oklahoma City, Okla., imprv., ex... compressor station near here. $350,000.

Kan., Iola—COMPRESSOR STATIO... Cities Service Gas Co., Southeast of City, O... homa City, Okla., expan., imprv. compre... station (Petrolia), near here. $300,000.

La., Logansport—DEHYDRATION PLA... —Southern Natural Gas Co., Watts Bl... Birmingham, Ala., imprv. dehydration pl... incl. gas scrubber unit addn. $60,000.

★**Mich., Detroit** — PLANT — United St... Rubber Co., 4600 Jefferson Ave., 4 st... bsmnt., 174x130 ft., 3 story, 56x165 ft., pl... addns., for production high flotation ti... $3,015,775.

Minn., St. Louis Park—WAREHOUS... American Refrigerator & Machine, Inc., ... N. 2 St., Minneapolis, plans by Lan... Raugland, 502 Wesley Temple Bldg., M... neapolis, 1 story, 120 x 220 ft., conc... block walls, steel I-beam warehouse. $... 000.

N. Y., Ballston Spa—PLANT—Amer... Hide & Leather Co., Inc., at office Ke... Holroyd, consult. engrs., 257 Bway., T... rejected bids Aug. 28, factory addn. ... 8/16—ENR 8/24.

O., Toledo—FACTORY—Willys-Over... Motors, Inc., Wolcot Bldg., factory alt... tions. $66,562.

Ore., Drain—MILL—Whipple Mill ... Drain, sawmill. $75,000.

Ore., Roseburg—SHOP—Dillard Motor ... Roseburg, auto repair shop. $61,000.

Pa., Bridgewater—BAKERY—Kerr... Bakery, Inc., L. H. Braum, pres., Mar... St., plans by W. E. Long Co., 155 N. C... St., Chicago, Ill., 2 story, 40x135 ft., st... brick bakery addn. $40,000.

Pa., York—FACTORY, etc.—Alley ... Mfg. Co., 501 Prospect St., bids soon, br... steel factory, laboratory and offices. $75...

R. I., Phillipsdale—FACTORY—Gantes... & McMullen, engrs., 99 Chauncy St., Bos... Mass., brick factory addn., for Bird & ... Inc., Phillipsdale. Over $40,000.

Tex., Edinburg—CREAMERY—W. B. M... thews, 2419 W. 10 St., Dallas, 1 story, br... rein.-con., etc. creamery plant. $40,000...

Tex., Fort Worth — PLANT — Hobbs ... Co., 609 N. Main St., rejected bids Aug. ... 200x300 ft. mfg. plant. $175,000. C. H. ... & Son, P. O. Box 926, Austin, archts. ... 8/23—ENR 8/24, under LB.

Tex., Texas City—PLANT—Tin Proce... Corp., Texas City, expan., imprv. plant. ... 000. Rob. J. Cummins, Bankers Mtg. Bl... Houston. $40,000.

...STRIAL BLDGS. (Proposed Work, ...t'd.)

...Beloit—FACTORY—C-Z Chemical ..., 1447 Argall St., plans by C. E. Wolfley, ...ent Bldg., Rockford, Ill., 3 story, 50x60 ... brick or concrete block factory, concrete ...

...E., Halifax—WAREHOUSE, etc.—...ney Supplies, Ltd., Halifax, builders sup-...rehouse and mill. $50,000.

...St. Albert—PLANT—La Co-Operative ...agere de St. Theophile, c/o J. Richer, ...Albert, Twp. of Cambridge, plant. $40,-...

...Thorold—ABATTOIR—Essex Pack-... Co. Ltd., 1 Arthur St., Essex, plans by ...C. Klasha & Associates, 49 King St. E., ...ener, 75x85 ft., rein.-con. abattoir. ... CD 12/6—ENR 12/9. ...

...Toronto — PLANT — Annfern Forest ...ucts Ltd., R. W. Brownell, 330 Bay ...woodworking plant. $50,000.

...Toronto — PLANT — Chinook Supply ..., Ltd., c/o C. M. Sinclair, 2881 W. Dundas ...iron, steel, wood and plastic goods mfg. ... $40,000.

...Toronto—PLANT—Owner, c/o I. M. ...sters, archt., 26 Queen St., E., 3 story, ...ct., 92x150 ft., brick, steel frame mfg. ..., concrete fdn. $80,000.

...Toronto — PLANT — Paradise Chil-...'s Wear Ltd., c/o V. Giblan, 484 Rus-...Rd., children's wearing apparel, etc. ... plant. $40,000.

...Toronto—FACTORY—Royal Knit-... Co. Ltd., 1 Silverwood Ave., plans by ...Brown, 21 Dundas Sq., 2 story, part ...ct., 52x120 ft., brick knitting factory, ...rete fdn., 552 King St. W. $40,000.

...Toronto—WAREHOUSE—J. E. Hal-..., purch. agt. Shell Oil Co. of Canada, ...26 Adelaide St., soon lets contract 1 ..., 60x260 ft. brick warehouse, concrete ..., Carlaw Ave. $75,000.

...Toronto—FATORY—York Leather ...ucts Ltd., c/o D. Sussman, 20 Austin ...ment, factory. $40,000.

...Trenton—COLD STORAGE PLANT ...tral Cold Storage Ltd., Trenton, cold ...age plant. $50,000.

...Wallaceburg — PLANT — National ...sure Cooker Co. Ltd., Wallaceburg, 1 ..., 150 x 150 ft., steel, concrete brick, ..., concrete fdn. $50,000. J. Hood, Burl-..., supt.

...Ames—DIAMOND DRILLING—...rand Mining & Development, Ltd., ...diamond drilling. $90,000. P. Malouf, ... Owner, engr.

...Amos—PLANT—La Revue Moderne ... and Associated Companies, c/o H. ...lier, Amos, printing, lithographing ..., etc. $40,000.

...Montreal—PLANT—Air Vent Sheet ...al Ltd., c/o M. A. Mendell, 169 W. Craig ... machine tool, dies, etc. mfg. plant. ...

...Noranda—MINING DEVELOPMENT ...o-Reuyn Ltd. Noranda, mining develop-..., incl. shaft sinking and necessary ...ctures. $85,000.

...Quebec City—FACTORY—Sico Paint, ..., 10 First Ave., 1 story factory. $50,000.

...S ASKED

Bids Asked October 1

...Houston—SHOP—Houston Oil Field ...rials Co., 1524 Maury St., 1 story, ...00 ft. brick, concrete, tile, steel shop ... 32x32 ft. wing, Wayside Dr., $240,000. ...Moore, 2008 W. Alabama Ave., archt.

...Altoona—BAKERY—Stroehmann Bros. ...E. J. Stroehmann, in charge, 329 Wash-...n Bldg., Williamsport, 2 story, bsmnt., ...00 ft., brick, hollow tile, steel bakery ..., sprinkler sys. $40,000. C. Wagner, ...W. 4 St., Williamsport, archt. CD ...—ENR 5/25.

...TRACTS AWARDED

...East Hartford—PLANT, etc.—Pratt ...Whitney Div. United Aircraft Corp., 400 ...St., brick, steel rein.-con. bldg., and ...al work wind tunnel, to Turner Constr. ..., 33 Newbury St., Boston, Mass., $475,000. ...rt Kahn Associated Architects & Engi-..., Inc., 345 New Center Bldg., Detroit, ..., engrs.

...Naugatuck — FACTORY — Nauga-... Chemical Div., U. S. Rubber Co., Elm ..., brick, concrete, steel factory process ..., laboratory and office, to W. J. Megin ..., Inc., 51 Elm St. Est. over $40,000. ... 9/6. Blaw Knox Co., 342 Madison ..., New York, N. Y., engrs.

...Stratford—STRATOSPHERE FACIL-...—Chance Vought Div. United Aircraft ..., 550 Main St., fdns. for stratosphere ...ities, aircraft plant, Main St., to John ...Ryan Constr. Co., 369 Lexington Ave., ... York, N. Y. Total est. over $40,000. ... 9/6. CD 9/5—ENR 9/7.

...Shreveport—PLANT—Brewster Co., ...Fannin St., 140x220 ft., concrete, steel ... bldg. Fortson St. in Agurs, Shreveport. ... H. Treadwell, 1523 Centenary Blvd. ...120. CD 9/1—ENR 9/7.

...Brighton (sta. Boston)—PLANT—... Eagland Rendering Co., Abattoir ...nds, 50x180 ft., brick glue bldg. addn. ...ations, concrete fdn., to Sawyer Constr. ..., 31 St. James Ave., Boston, approx. ... CD 9/6—ENR 9/14.

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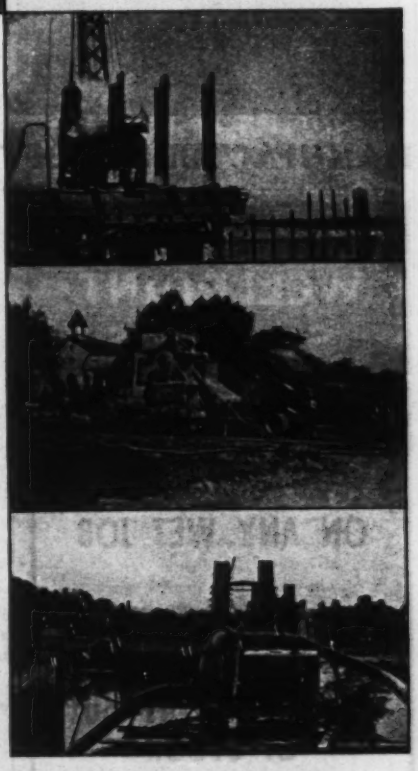

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INDUSTRIAL BLDGS. (Contracts Awarded Cont.d.)

Mass., Dorchester—STORAGE—Frost Co. & Oil Co., 488 Neponset Ave., 15x122 ft. & 25x123 ft. timber storage bldg., to John Proctor Co., Inc., 89 Broad St., Boston. **$45,000.**

Mass., New Bedford — MILL — Nation Fairpoint Co., Prospect St., 1 story, 17x44 ft., wood, steel mill addn., concrete fdn., Olson & Appleby, 222 Union St., appr. **$40,000** incl. equip.

Md., Baltimore—CABLE BLDG.—West Electric Co., 2500 Broenning Hy., Cable Bl 30 addn. Owner builds. **$300,000.**

Minn., Detroit Lakes — PLANT — La Dairy Cooperative, H. T. Johnson, pr Audubon, general contract 1 story, bonnet., 72 x 108 ft. milk dehydrating pla rein.-con., brick, tile, to Elian & Ness, Fer Falls, **$39,625.** CD 8/16—ENR 8/24.

Minn., St. Paul — PLANT — G. Bartu Packing Co., 567 North Cleveland Av general contract plant addn., alterations, Constructor Co., 786 Eustis St. Est. $75,0 Molkenbur & Lutz, 2168 Juliet Ave., archts

N. J., Mt. Holly—WAREHOUSE—Pe more Bros., 15 Buttonwood Ave., 1 sto 100x200 ft., cinder block warehouse, to J thur Venneri Co., 259 N. Broad St., Elizabe **$45,000.** W. Hankin, River Rd., Washi ton's Crossing, N. J., (P. O. Taylorsv Pa.), archt.

N. J., Nutley—PLANT—Electro-Techni Products Co., 113 E. Center St., 1 sto 75x400 ft., concrete block, stucco mfg. pl separate contracts. **$50,000.** J. R. Kor 264 New York Ave., Newark, archt.

N, H., Concord—FACTORY—Davis Tra former Co., 295 North State St., 1 st 80x100 ft., brick, steel factory addn., to Da son Constr. Co., 1306-A Elm St., Manches Est. **$40,000.**

N. H., Keene—FACTORY—H. Kharfen, Washington St., 1 story, 62x160 ft., br factory, Washington St., to G. W. Scott, Washington St. Est. **$43,000.**

N. H., Keene—PLANT—New Engl Screw Co., Emerald St., 1 story, 110x200 brick, steel plant, to Davison Constr. C 1306-A Elm St., Manchester. Est. **$100,00**

O., Cleveland—PLANT—Chase Brass Copper, W. L. Smith, factory supt., 1 Babbit Rd., installing heavy rein.-con. fo ings and fdns., for machine installations 10 ton structural steel overhead crane, Cleveland Constr. Co., 3866 Carnegie A Est. **$100,000.**

O., Cleveland—FACTORY—Cleveland C phite Bronze Co., B. F. Hopkins, pres., 10 St. Clair Ave., 1 story, 200x300 ft., br steel, concrete Plant 5 factory addn., Albert M. Higley Co., 2036 E. 22 St. **$275,000.** Awarded 9/8. J. H. Graha archt. and F. Saltzman, engr.; both c/o ow

O., Cleveland—SHEAR SHOP—Ohio Fo & Machine Co., Co., S. C. Dalbay, pres., Woodhill Rd., 1 story, 50x71 ft., brick, s shear shop, to H. L. Vokes Co., 5300 Che Ave., **$40,000.** A. R. Simon, c/o contrac engr.

Ore., Portland—PLANT—Portland Fa cating Co., 740 N. Page St., reconstruct forging plant, to Jan J. Malarkey Co Co., 923 S. W. 17 St. **$50,000.** Awarded

Pa., New Castle—PLANT—United En neering & Foundry Co., G. T. Ladd, pr 1st Natl. Bank Bldg., Pittsburgh, p addn., installing 12 furnaces, brick w steel, to International Chimney Corp., Cur Bldg., Buffalo, N. Y.; piping, to Sch Choffin Co., 12 Hogue St., Youngstown, Est. **$40,000.** W. R. Hodder, project mg

R. I., Bristol—FACTORY—United St Rubber Co., 500 Wood St., 3 story, 582 ft., brick, steel mfg. bldg., concrete f to H. V. Collins, 7 Dyer St., Providen over **$75,000.** CD 8/30—ENR 9/7.

R. I., Cranston—TRUCK GARAGE, et Adley Express Co., Inc., 216 Crown St., Haven, Conn., 1 story, brick, steel tr garage and freight terminal, Elmwood A to E. Turgeon, 614 Turks Head Bldg., Pro dence. Est. **$60,000.** Bids 8/6. CD 8/ ENR 8/31.

Tex., Corpus Christi—QUICK FRE AND STORAGE PLANT—Duke Collum, City Council, seafood quick freeze and s age plant, own forces. **$100,000.** CD 5/ ENR 5/25.

★**Tex., Katy** — RECYCLING PLANT Humble Oil & Refining Co., c/o F. Wa purchasing agt., Humble Bldg., Houst recycling plant addn., to Hudson Engineer Co., 2711 Danville St., Houston. appr **$700,000.**

Tex., Houston—PLANT—Houston Oil M Materials Co., 1524 Maury St., 1 story, 1 150 ft., masonry and steel chemical p units, facilities, to W. S. Bellows Con Co., Box 2132, **$95,000.** CD 8/9—ENR 8/17

Tex., Uvalde—WAREHOUSE—H. W. tle, Inc., Uvalde, masonry type warehou to G. W. Mitchell, 612 American Hospital Life Bldg., San Antonio, **$40,000.** Morri Noonan, 801 American Hospital & Life Bl San Antonio, archts. CD 6/22—ENR 6/

Wis., De Pere—BEATER ROOM—U. Paper Mills Corp., De Pere, 1 story, 6 ft., brick, concrete beater room bldg., Selmer Co., Northern Bldg., Green Bay.

...DUSTRIAL BUILDINGS (Contracts ...arded. Cont'd.)

...Roanoke—FREIGHT TERMINAL, etc. ...ociated Transport, Inc., c/o A. J. Car... ...archt., 225 Memorial Ave., West Spring... ...Mass., brick, steel, concrete freight ...inal, truck garage, to Eubank & Cald... ...Bailey Bldg. Est. $50,000. Bids 8/14. ...8/4—ENR 8/10.

...B., Moncton—PLANT—Swift Canadian ...Ltd., J. A. Ford, mgr., Albert St., curing ...bldg. addn., hide cellar and fertilizer ...to Richard and R. A. Ryan, Ltd., 1808 ...Dan St., Montreal, Que. $60,000. CD ...—ENR 8/12.

...Leaside (Toronto) — SERVICE ...HOUSE—Margison & Babcock, archts., ...Wellington Bldg., Toronto, 1 story, ...ft. service warehouse, for Sheridan ...Nurse Co., Ltd., 7 Industrial St., to ...Bros. Constr. Co. Ltd., 17 Yorkville Ave., ...Const. Co. Ltd., 17 Yorkville Ave., ...Est. about $55,000. CD 8/9—...8/17.

...Niagara Falls — PLANT — Canadian ...ition Products Co. Ltd., 431 Victoria ...story, 75 x 100 ft., plant addn., to ...Bros. Constr. Co. Ltd., 1740 Ellen St. ...$75,000. CD 9/12—ENR 9/14.

...Sarnia—PLANT—Imperial Oil, Ltd., ...urch St., Toronto, brick plant, to Shaw ...Co. Ltd., Forest, about $48,700. CD ...ENR 4/6.

...Smith's Falls—FACTORY—Cairns ...ts Ltd., 7 Maple St., factory, William ...to M. Sullivan & Son Ltd., Arnprior. ...$40,000. W. J. Abra, 55 Metcalfe St., ...wa, archt.

...Windsor — PLANT — Border Cities ...A Creamery Co., 636 Aylmer St., plans ...Heppard & Masson, 26 Equity Chambers, ...atham St. W., 2 story, 42x85 ft., mason... ...ant addn., concrete fdn. $40,000.

UNCLASSIFIED

...POSED WORK

...., Fairfield — BEACH IMPROVE...TS—Town, Bd. Recreation, Mrs. M. E. ..., chn., making plans imprv. Sasco ...parking provisions, land construction, ...ing road, constructing new road to ... $25,000.

...—GAS PIPELINE CARRIER— ...Service Gas Co., SE of City, Okla... ...City, Okla., 5⅝ mi. 16 in. natural gas ...line carrier from point in Wilson Co. ...nect with 3 existing transmission line ...ers. $40,000.

..., Minneapolis—HANGAR—Mid-Conti... ...Airlines, Inc., 6501 34 Ave. S., 1 and 2 ... 62x40 ft. hangar addn. at Wold-...berlain field (Minneapolis Airport). ...k. Larson & McLaren, 1901 Foshay ..., archts.

..., Dayton — REBUILDING BABBITT ...—Moraine Products Div. of General ..., 1550 Wisconsin Ave., tearing down ...babbit line and rebuilding new babbitt ... $57,500.

...homa and Kansas—GAS PIPELINE ...RIER—Cities Service Gas Co., SE of City ...oma City, Okla., 52 mi. 16 in. natural ...pipeline carrier from Shidler, Okla., to ..., Kan. $300,000.

..., Bristow-Mounds—NATURAL GAS ...LINE—Oklahoma Natural Gas Co., 624 ...ston St., Tulsa, exten., reconditioning ...al gas pipelines. Over $40,000.

..., Dallas — AIRPORT BLDG. — City, ...ng size existing administration bldg., ... Field. $150,000.

...h, Brigham—SWIMMING POOL—U. ...., 540 E. State St., Salt Lake City, ...ng plans 60x100 ft., all-year, closed-in ...ming pool at Bushnell General Hos...

...kington — RAILWAY REPAIRS — ...ern Pacific Ry. Co., B. Blum, ch. engr., ...5 St., St. Paul, Minn., repairing branch ...Elma to Shelton. $294,840.

...Va., South Charleston — STORAGE ..., etc.—Carbide & Carbon Chemicals ...30 E. 42 St., New York, N. Y., in... ...g anhydrous ammonia storage tank, ...ne oxide storage tank and soaking ... $146,700.

...a, Calgary—COAL MINING DEVEL...MENT—Syndicate, c/o R. M. Sweezey, ...St. James St. W., Montreal, Que., initial ...pment extensive coal mining property ...ighwood River Valley. $700,000. G. ...ns Evans, Smith Tower, Seattle, Wash.,

...a., Okotoks—RAILWAY LINE—Syn...cate, c/o R. W. Sweezey, 132 W. St. ...St., Montreal, Que., 42 mi. railway line ...Okotoks to portals of Highwood River ... Mine. $500,000. G. W. Evans, Smith ..., Seattle, Wash., engr.

..., Bathurst — PLAYGROUND, etc. — ...pality, playground and recreational ...es. $38,000.

...—GOLF CLUB, etc.—Recreational ...of Ottawa, c/o M. E. Kenny, R. A. ...Rideau St., Ottawa, Ont., preparing ...golf club, $75,000, summer resort, ..., ski lodge $40,000.

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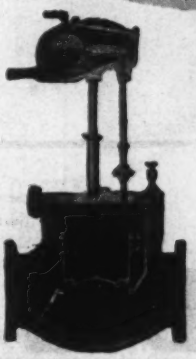

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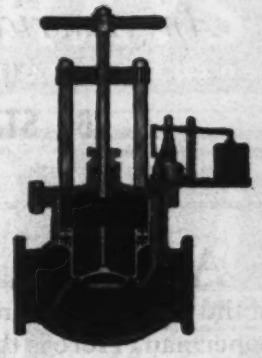

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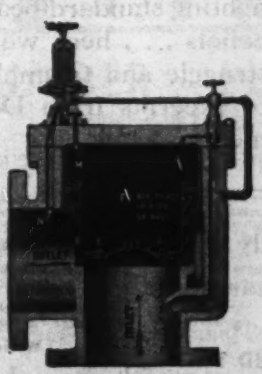

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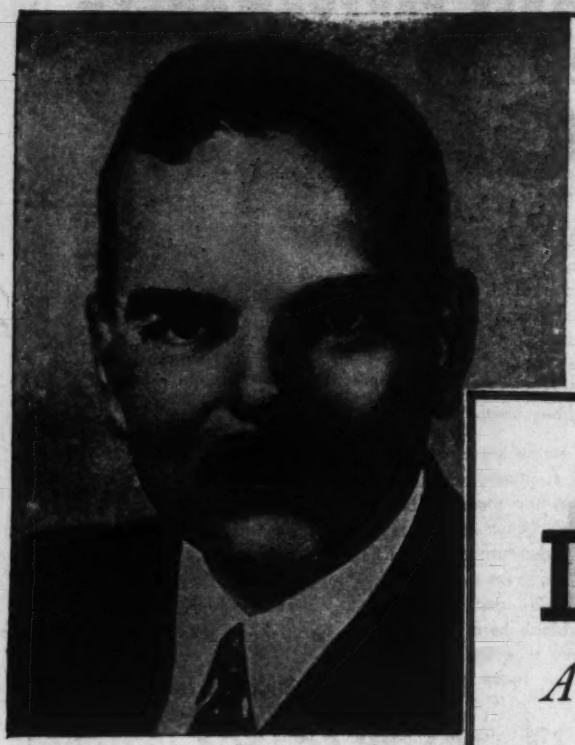

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...Dahlgren—ELECTRIC DISTRIBU... SYSTEM—Yards & Docks, Navy Dpt., ...st. and Constitution Ave. N.W., Wash., D. C. impry. electric distr. sys. at Naval ...ing Ground, NOY 10732.

BIDDERS

...Calif., Hamilton Field—APRONS—U. S. ...t, 74 New Montgomery St., San Francisco, ...t 13, aprons, at Air Transport Command, ...c. 1774, from Fredrickson & Watson ...str. Co., 373 81 Ave., Oakland, $477,379. ...8/25—ENR 8/31.

...Calif., Oakland—TAXIWAYS—U. S. Eng., ...New Montgomery St., San Francisco, Zone ...Taxiways A and B at Oakland Municipal ...port, Spec. 1400-1, from Piazza & Hunt... ...175 S. Montgomery St., San Jose, ...,497.

...Y., Brooklyn — SURFACE RAILROAD ...CKS—Bd. Transportation, 250 Hudson ...New York, Zone 13, Sept. 12, renewing ...face railroad tracks, Wythe Ave. from ...Kent Ave. to S. 9 St., from R. P. ...ters, 475 5 Ave., New York, $45,832.

CONTRACTS AWARDED

...Calif., Fairfield — APRON PREPARA... ...ks, etc.—U. S. Eng., 1209 8 St., Sacra... ...ta, Zone 5, excav., and preparation of ...base for aprons and taxiways at Fair... ...Suisun Air Field, Spec. 960, to Morrison-...dsen Co., 111 Sutter St., San Francisco, ...,341. CD 8/23—ENR 8/31.

...Colo., Pueblo—DOCKS, etc.—U. S. Eng., ...17 St., Denver, docks, sheds and bumper ...ks at Pueblo Air base, to Johns Engineer... ...Co., 1708 Ames St., Denver, $80,000.

...Ga., Atlanta—ANTOMATIC SPRINKLER ...STEM—U. S. Eng., Post Office Bldg., ...nnah, installing, completion automatic ...nkler sys., Fort McPherson, to Century ...nkler Corp., 306 Graham St., Richmond, ...$179,885. Bids 9/11. CD 9/6.

...Ind., Evansville—TANK TEST TRACK—U. S. Eng., 413 Federal Bldg., Louisville, Ky., ...test track for Evansville Ordnance, to ...el Constr. Corp., 403 Court Bldg., ...,240.

...Mass., Martha's Vineyard—AIRPORT ...ING—Yards & Docks, Navy Dpt., 18 ...and Constitution Ave. N.W., Wash., 25, ...paving addnl. plane parking area, air... ...NOT 10130, to McCourt & Condon Co., ...Huntington Ave., Roxbury, $55,799. ...7/11. CD 7/25.

...Mass., Southbridge—HANGAR, etc.—Town ...Selectmen, Town Hall, hangar, 2,000 ft. ...2,500 ft. runways, to F. J. Shields, 91 ...Main St., $59,251. CD 9/8—ENR 9/14, ...7 LB.

...N. Mex., Alamogordo—AIR BASE—U. S. ...Albuquerque, addnl. work, Army Air ...to Gaastra & Gilbert, 1534 Las Lomas ...$60,123. Awarded 9/15.

...N. Mex., Hobbs—AIRFIELD BLDG.—U. S. ...4 and Gold Sts., Albuquerque, ware... ...Army Airfield, to H. W. Balay, Albu... ...$40,000.

...Ohio, Akron — RADIO TRANSMITTER ...E, etc.—United Broadcasting Co., Sta... ...WCLE, H. K. Carpenter, vice pres.-...mgr., Terminal Tower, Cleveland, ra... ...transmitter house, towers and broad... ...studio, to Carmichael Constr. Co., ...Miller Ave. Est. $150,000. R. Dicker... ...3134, Shaker Sq., Cleveland, archt.

...Ohio, Cleveland—TANK STORAGE CRIB... ...WORK, etc.—Standard Oil Co. of ...c/o H. West, engr. in charge, Mid... ...Bldg., cribbing work, excav. and pump ...for addnl. tank storage, to Paugh & ...Inc., 2407 Euclid Ave. Est. $85,000.

...Oklahoma—REMOVING PIPE—Sinclair ...Line Co., Bartlesville, removing 8 ¼ ...in. screw pipe near Tulsa and Nowata, ...C. Price Co., Bartlesville, $25,000.

...Tex., Laredo — POORMAN RANGES — ...Eng., Fort Sam Houston, poorman ...s to Cunningham & Dinn, 2024 N. St. ...St., San Antonio, $47,356. Awarded

...Tex., Seminole—OIL PIPELINE—Atlantic ...Line Co., Magnolia Bldg., Dallas, 6 ¼ ...in. oil pipeline, force account. $45,000. ...—ENR 8/31.

...Tex., Tyler — OIL PIPELINE — Phillips ...eum Co., Esperson Bldg., Houston, ...oil gathering pipeline sys., force ac... ...$60,000. CD 9/8—ENR 9/14.

...Can., Calgary—OIL PIPELINE—British-...an Oil Co. Ltd., Calgary, 17 ½ mi. 6 to ...crude oil pipeline, near here, to ...Gentry Engineering Co., Calgary, ...,000.

...Can., Edmonton—AIRPORT STRIPPING, ...Dpt. Transport, Ottawa, Ont., stripping, ...st. drainage, concrete hardsurfacing ...sys. etc., airport, to Crown Paving ...Co., Ltd., Edmonton, about $193,000.

...Can., Watson Lake—AIRPORT GRADING, ...Dpt. Transport, Ottawa, Ont., grading, ...acting concrete runways, bituminous ...ing airport, to General Const. Co., Ltd., ...ille Island, Vancouver, about $140,000.

Special Advertisements see p. 202 & 218

Postwar Projects see p. 140

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Salida,	Col.	Alameda,	Cal.	Portland,	Ore.

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OFFICIAL PROPOSALS

Bids: Oct. 4 (300)

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS BUREAU OF CONTRACTS & ACCOUNTS ALBANY, N. Y.

Sealed proposals will be received until one o'clock p.m. eastern war time, by Henry A. Cohen, Director, Bureau of Contracts & Accounts, 14th Floor, State Office Building, Albany, N. Y., on *WEDNESDAY, OCTOBER 4, 1944*, for the construction of the following highway project:

County	Deposit for plans	Bid deposit	Type	Miles	Priority
Orange	$10	$10,000	22' ROB		
			Gravel Double		Serial
			Surface		#121369
			Treatment	4.13	A.A. 3
					All Mats.

AND ALSO FOR REPAIRS TO THE FOLLOWING — DISTRICT OFFICE BUILDINGS:

Broome	5	5% of the bid	Reroofing Machine Shop and Storage Sheds, District Office at Binghamton, N.Y.
Jefferson	5	5% of the bid	Boiler Brickwork Repairs Boiler House, District Office at Watertown, N. Y.

Maps, plans, specifications, and estimates may be obtained at the office of the Department of Public Works, Bureau of Contracts & Accounts, Albany, N. Y., and at the office of the District Engineers in whose districts the work is located. The addresses of the District Engineers and the counties will be furnished upon request, and may be seen at the office of the State Department of Public Works, State Office Building, Room 898, Worth & Center Streets, New York City.

The deposit for Plans and Proposal Forms for each contract containing 1 to 15 sheets is $5.00; 16 to 30 sheets, $10.00; over 30 sheets, $20.00. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of the award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specifications, and contract agreement, and to the special provisions applying to projects financed with federal funds. Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by cash, draft or certified check payable to the order of "State of New York, Commissioner of Taxation & Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instructions to Bidders."

When optional types are permitted on contracts with federal funds, bidders must state in the space provided in the proposal the exact designation of the optional type upon which the proposal is predicated.

Minimum Wage Rate per hour for above work shall be as follows:

County	Skilled Labor	Intermediate Grade Labor	Unskilled Labor
Orange	$.85	$.85	$.85

OFFICIAL PROPOSALS

UNLESS SHOWN OTHERWISE IN T ITEMIZED PROPOSAL FOR EA PROJECT. The right is reserved to re any or all bids.

CHAS. H. SELL SUPT. OF PUBLIC WORK

Bids: Oct. 4 (2

Water Pipe Line

Sealed proposals will be received by Mayor and City Council in the City H at Coatesville, Chester County, Penns vania, until 3:00 o'clock p.m. on Oct. 1944, at which time and place the bids be publicly opened and read aloud, for construction of approximately 14,700 lin feet of 8", 12" and 16" water pipe line diversion dam; and miscellaneous app tenances in the water system.

Copies of the plans, specifications other contract documents are on file open to public inspection at the office Albright & Friel Inc., Consulting Engine 1520 Locust Street, Philadelphia 2, Pen and at the office of the City Engineer Coatesville and sets of the documents be obtained at the office of the Consult Engineers or at the office of the C Engineer, upon a deposit of $20.00 for e set of documents. If the documents returned in good condition within five days after the opening of bids, the amount of the deposit for one set will refunded to each actual bidder; and ot deposits will be refunded with a deduct of $10.00 to defray the actual cost of production of the sets of documents. the documents are not returned within time stated, the entire amount of dep will be forfeited.

A certified check equal to five perc (5%) of the amount of the bid must submitted with the proposal as bid secur A bid bond may be substituted for a ce fied check.

No bid may be withdrawn for thirty (days after the scheduled closing time receipt of bids.

The Mayor and City Council of Coa ville reserve the right to waive any in malities in or to reject any or all bids.

Frank P. Pennega City C

Adv- 9/14 - 9/21, 1944

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The Week In Engineering and Construction

INEERING NEWS-RECORD • SEPTEMBER 21, 1944 • VOLUME 133 • NUMBER 12

WA survey shows lag in ostwar public works plans

ss than 8 percent of 16 billion dollar local governat program, including federal-aid work planned by te road departments, is completely planned.

y members of the armed forces ing to find immediate postwar emt on public works construction be greatly disappointed unless action is taken to increase the vol- of completed project plans. This conclusion to be drawn from a al Works Agency report released ek on postwar planning progress r, county and municipal agencies. gh the study indicates a reservoir een billion dollars of construction stages of planning by local gov- tal bodies, projects that are in mpletely designed stage total only ,000,000, and funds are available ry out but one-fourth of the proj- this status.

Few active localities

s total is more disappointing when akdown of the completed plans is This analysis reveals that only 00,000 of state highway work is for contract, and that two-thirds $924,905,000 total (excluding cost d) of all other types of work for plans are ready was reported by e and local governments of only s—New York, California, Illi- ichigan and Ohio. Further analy- s that two-fifths of all completed r other than highway work is rated in the five cities of New Chicago, Philadelphia, Detroit s Angeles. The vast majority of ies under 25,000 population have little planning progress.

t side of the survey picture is e volume of construction in the design" and "preliminary design" This total provides for over billion dollars of work and in- nearly two billion dollars of high- rojects and some $5,044,000,000 er types of construction.

ainder of the sixteen billion dol- ervoir is in the "idea" stage. This class accounts for over eight billion dollars, including nearly two and one-half billion dollars of highway construction.

Report is conservative

In preparation of the report it was assumed that no plans had been completed nor were being prepared by those government units that failed to reply to the FWA questionnaire. As a result, in the totals of completed plans for other than state highway work no projects are included for four states, none for nine of the 92 cities of a population of 100,000 or more, and for only 252 of the 599 municipalities in the 10,000-25,000 bracket.

Neither do the totals include normal maintenance projects, work now underway or to be completed as part of the war program, public housing, and federally financed projects, such as river and harbor operations.

All projects being planned were listed as falling in one of nine classifications. The classifications were: (1) Highways, roads and streets; (2) bridges, viaducts and grade separations; (3) airports, terminals and landings; (4) sewer, water and sanitation facilities; (5) schools and other education facilities; (6) hospital and health facilities; (7) public buildings other than those in classes 5 and 6; (8) parks and other recreational facilities; and (9) miscellaneous public facilities.

On the basis of this classification the greatest volume of construction planned was in the "highways, roads and streets" category. This situation is explained by the fact that $50,000,000 of federal funds was made available to the states

(*Continued on page* 73)

N.Y. City ready to spend $400 million on 1945 construction if U.S. pays half

New York City is prepared to carry out a $400,000,000 construction program in 1945 if Congress acts at once to meet half the cost, Mayor F. H. LaGuardia declared last Sunday in his weekly radio broadcast. The mayor also disclosed that in his annual capital budget message to the City Planning Commission he had certified that the city might safely incur debt up to $300,000,000 for capital projects in 1945.

The mayor's $400,000,000 program is made up of $150,000,000 of new capital expenditures for work other than highways and housing, which he expects to be matched with federal funds in a like amount, $30,000,000 of federal and state aided highway work, $30,000,000 to $40,000,000 of low-cost housing, $20,000,000 of improvements covered by assessments, $15,000,000 of new work on the Brooklyn-Battery Tunnel, and $1,000,000 spent by the Triborough Bridge Authority.

Mayor LaGuardia stated that the city and the New York City Tunnel Authority were planning to apply to the War Production Board for priorities on about 700 tons of nuts and bolts needed before work can be resumed on the Brooklyn heading of the Brooklyn-Battery Tunnel, work on which was stopped early in th ewar. The Tunnel Authority has the castings for the lining but lacks the large forged bolts that must be on hand before soft ground tunneling from the Brooklyn end can get under way again. The New York heading is in rock, so it can start anytime.

In the interim since the work was shut down the Tunnel Authority, according to Ole Singstad, chief engineer, has completed all its contract drawings and so is in a position to put a large amount of work under contract at any time.

(*Continued on page* 72)

Acme P

Atlantic City bears the brunt of a tropical coastal storm

Worst damage from the tropical storm that lashed the eastern seaboard last week occurred to New Jersey beaches and beach structures. At Atlantic City miles of boardwalk were torn up and piers extensively damaged. Hotels and homes were flooded and power service disrupted. Pictured above is a section of the beachfront at the resort city.

There was considerable marine damage, especially to small boats, all along the eastern coast. Trees throughout the area were blown down, blocking highways and carrying electric and telephone lines with them. Fallen electric wires were said to be the cause of many of the more than forty deaths attributed to the storm. Adequate warning and early evacuation of beach areas kept down the death and property toll though the latter has been estimated by newspapers at as much as $50 million.

In contrast to the 1938 storm (ENR Sept. 29, p. 386 and Oct. 6, 1938, p. 425) has been little damage to important tures. A temporary pipe scaffold (ri extending 85 ft. above the roof of a 60- building in midtown New York City twisted but survived the 85-100 mph. of wind at the height of the storm. bridges of noteworthy size were affected there were no floods of more than local sequence, despite two days of rain prece the tropical downpour of the storm.

Serious water problems forecast for Arizona

Indications that large sections of central and southern Arizona soon may be confronted with a serious water problem as a result of a shortage of precipitation, now in its second year, were contained in a U. S. geological report issued Sept. 9 in Tucson.

The report, which dealt with ground water conditions and pumpage, showed that in Pinal County, pumping from underground supplies has risen from 372,000-ac. ft. in 1940 to 515,000-ac. ft. in 1943. In other regions, pumpage has increased proportionately.

Heavy decreases in water tables were also recorded in several areas. The report showed that in the Elroy area the table has dropped 12 ft. in the last two years and in the Maircopa district the drop was 10 ft. The total drop in the Elroy area from 1940 to December, 1943, was 18½ ft. The Queen Creek area dropped 2½ ft. in 1942 and 3 ft. in 1943.

Governor and cabinet discuss Pittsburgh roads

A 5-year, $75,000,000, state highway improvement plan for Pittsburgh and Allegheny County was discussed by Governor Edward Martin and his cabinet at a meeting Sept. 8 in Pittsburgh. The plan involves 107 miles of road, and is part of the state-wide program to cost $516,000,000.

Plans for one-third of Allegheny County projects will be blueprinted by November, John U. Shroyer, secretary of highways, revealed. Plans for the Penn-Lincoln Parkway will be completed in October.

State and city officials have agreed tentatively to classify the Ohio River Boulevard extension as No. 1 project for postwar improvement, Penn-Lincoln Parkway to rank second in importance.

Texas State Highway 183, a faster and shorter route to Fort Worth from North Dallas, is scheduled to be opened for traffic in October.

Illinois reports on postwar planning

Detailed plans and specifications been completed or are in progress $35,538,000 worth of postwar pu works in Illinois, exclusive of the of Chicago, according to a progres port dated Sept. 1, by the Illinois P war Planning Commission.

In addition to plans already c pleted, sketch plans for $54,396 worth of work have been complete are now in progress; surveys have b completed or are in progress for $ 700,000 worth of construction; w preliminary estimates only have b prepared for $128,758,000 of post public works.

Improvements included in this p posed $237,392,000 program co street improvement, sanitary and st water sewers, sewage treatment water supply, schools and other pu buildings, bridges and grade separa structures, airports and parks, po generating plants and distribution.

...enate cuts postwar highway fund to $1,350,000,000 for three years

...horized annual appropriation for each of three years following ...war set at $450,000,000 to be matched by the states

...Senate on Sept. 15 passed the ...postwar highway bill (S. 2105) ...greatly amended form from the ...bill. Principal changes were ...tion in the amount authorized to ...propriated annually in each of the ...postwar years from $650,000,000 ...original bill to $450,000,000 ...tion of the 50-50 matching pro... ...of prewar years, and changes in ...ethod of apportionment. Elimi... ...were all provisions for using fed... ...funds for the purchase of rights-... The bill now goes to the House, ...the Robinson bill is pending.

...ion on the Robinson bill in the ...(H.R. 4915) is to be postponed ...after election, according to Major... ...ader McCormack.

Distribution of funds

...$450,000,000 annual appropria... ...authorized in the Hayden bill is ...ed as follows: $200,000,000 for ...cts on the federal-aid system; ...000,000 for projects on principal ...dary and feeder roads; and $125,... ...00 for projects on the federal-aid ...in urban areas, communities of ...5,000 population.

...$200,000,000 for the federal-aid ...is to be apportioned among the ...by the old federal-aid formula, ...ea, ⅓ population, and ⅓ post-road ...ge.

...ds for secondary roads are to be ...tioned on the basis of ⅓ area, ⅓ ...population, and ⅓ rural-delivery ...and "star routes." A further ...ion makes it possible for states ...a population density of more ...200 per square mile to expend ...funds without regard to municipal ...daries. This provision would be ap... ...le in Massachusetts, Rhode Island, ...ecticut, New York, and Pennsyl...

...states where the state highway de... ...ents have control over all public ...the secondary road funds can be ...on the federal-aid system, if ap... ...d by the U. S. Commissioner of ...e Roads. States affected by this ...ion are Delaware, Virginia, West ...ia and North Carolina.

...ds for work in rural areas are to ...portioned among the states in the ...that the population of cities of ...or over bears to the total popula... ...f all such cities in the country.

...references to using federal funds for the purchase of right-of-way that were included in the original bill were eliminated from the amended bill as passed.

Of the $450,000,000 to be appropriated for the first postwar fiscal year, the sum of $100,000,000 is to become immediately available to the states for making plans and surveys and for construction, but no other part of the funds can be used to pay the cost of contracts entered into before the beginning of the first postwar fiscal year.

Crossing eliminations

Not less than 10 percent of all three classes of funds must be used to eliminate highway-railway grade crossings. The construction costs of such projects, other than those paid by the railways concerned, may be paid out of federal funds without matching by state funds, provided the railways pay not less than 15 percent of the construction costs.

In states that find it impossible to match their full share of the federal fund, the Federal Works Administrator may waive the matching requirements provided: (1) That all special taxes on motor vehicle transportation are applied to highway purposes; (2) that least 90 percent go to operating, maintenance and administrative expenses and interest and amortization of highway bond; (3) that the rate of none of such taxes has been reduced since Sept. 1, 1944, and that the proportion of such funds that is available for construction, together with any other funds for highway purposes, will be inadequate to match the federal allocations.

Forest and park roads

The bill also carries $25,000,000 for each of the three postwar years for forest highways, $12,500,000 for forest roads and trails, $4,250,000 for construction and maintenance of roads in national parks, and $5,000,000 for parkways to give access to national parks or monuments.

Up to 1½ percent of the federal funds can be used for advance planning of future extensions of the federal-aid system and for secondary roads.

As the states will have to put up about $405,000,000 of matching funds, this represents a total federal-aid program of about $900,000,000 per year for three years following the war.

Bragdon made Engineers' Chief of Construction

Brig. Gen. John S. Bragdon has been made Chief of Construction in the Office of the Chief of Engineers in Washington. In this position he will have general charge of all military construction activity in continental U. S. He was transferred to the Chief's office from command of the South Atlantic Division at Atlanta. In that position, since 1941, he supervised one of the largest and most diversified of the war construction programs, for which he was awarded the distinguished service medal for "exceptionally meritorious service."

General Bragdon

General Bragdon is a West Pointer and has served all of his professional career in the army. He came out of World War I a Major in the Corps of Engineers. In 1929-31 he was on duty in the Philippines returning to serve in the Chief of Engineers Office. In 1937 he was made District Engineer at Providence, R. I., serving there until 1941.

Fowler to So. Atlantic Division

Brig. Gen. R. F. Fowler has been appointed division engineer of the South Atlantic Division of the Corps of Engineers with headquarters at Atlanta, Ga., succeeding Brig. Gen. John S. Bragdon. General Fowler was born in Alexander, Neb., on Oct. 14, 1884. He attended the University of Nebraska for two years before his appointment to West Point, from which he was graduated in 1910 and commissioned a second lieutenant in the Corps of Engineers.

General Fowler

General Fowler has led an active army life since his first tour of duty as assistant to the district engineer at Rock Island, Ill., in September, 1910, serving at many stations throughout the country and abroad. He was promoted to the grade of colonel Feb. 18, 1939, and on June 14, 1940, he became commanding officer of the 20th Engineer Regiment.

From July 1, 1941, until Jan. 5, 1942, he served as chief of the operations and training section in the Office of the Chief of Engineers. On Jan. 14, 1942, he was made chief of the supply division and on June 19, 1942, promoted to the temporary grade of brigadier general.

FROM AN EDITOR'S NOTEBOOK

A visit to the Tennessee Valley reveals that the effect of drought on power production, future TVA construction, disposal of surplus equipment and stream pollution are matters currently commanding attention.

Knoxville, Tenn—Most frequent subject of conversation in the upper Tennessee Valley is the drought that has continued over several months. However, despite the lowest natural streamflow in 40 years and the largest demand for power ever made in the area, the Tennessee Valley Authority has been able to supply all the electricity demanded of it. About 200,000 kw. of steam units are in constant operation now to conserve water against a possibility of prolonged low runoff in the late fall and some power is purchased from other utilities in the Southeast. Reservoirs are a little lower than a year ago, but water to produce 2.4 billion kwh. of electricity is in storage and there is no foreseeable danger of serious shortage.

Future TVA construction

The Tenessee Valley Authority has some definite plans for additional major construction but on a curtailed and much slower schedule than the rush to provide power for war necessary industry in the area.

The South Holston and Wautauga projects on the upper Holston watershed, on which $11 million was spent as emergency power projects before they were stopped by the War Production Board, are the best prospect for immediate work. When completed, the dams will give flood protection to Kingsport and Elizabethton and are planned to permit power installations. Resumption of construction is contingent upon availability of materials and manpower. A long construction period is contemplated.

The Fort Loudoun Dam extension, a project to take the water from the Little Tennessee River through Fort Loudoun Dam by construction of a dam and a canal, is now a future project planned for a time when power requirements overtake the present energy available in the Tennessee Valley. Added storage at Fontana, Douglas and other reservoirs on the headwater tributaries of the Tennessee has increased the dependable flow to a point where additional units are economical for many of the dams, but, once the war industries slacken, there may be excess power available from existing installations.

Foundation conditions at proposed sites for seven flood control dams on tributaries of the French Broad River above Asheville are being investigated preparatory to planning for possible postwar construction. Compared to other TVA structures, these will be rather modest, the seven dams being estimated to have a total cost, including reservoir rights, of $7 million. None of them will incorporate power facilities.

Fontana Dam

Construction at Fontana, N. C. on TVA's largest dam has progressed to the point where both of the hammerhead cranes used for construction have been dismantled and sent to storage. As of September 1, about 100,000 cu.yd. of concrete remained to be placed from a total of 2,800,000 cu.yd. Filling the reservoir is scheduled to start November first when flow in the Little Tennessee is expected to be sufficient to permit bypassing water to operate the Cheoah and Calderwood dams of the Aluminum Co., immediately downstream.

Considerable work remains to be done in the reservoir, including removal of 24 miles of railroad track, replaced by a 15.5 mile relocation of a branch line of the Southern R. R. above reservoir level. Part of the track is being left in place until the "last minute" to permit removal of construction equipment by rail. Highway hauling for heavy machines is precarious and expensive over the mountain roads.

Fontana construction forces have a war bond payroll deduction of 21.3 percent from 100 percent of the nearly 3,000 on the payroll. Purchases through the job accounting offices amount to 24 percent of the total payroll; were 20 percent after the fourth war loan and 15 percent after the third loan.

Something new has been added to construction at Fontana Dam. Project Manager F. C. Schlemmer has had a public address system installed on the project, not just in the mess hall and at the time-checking gate, as has frequently been done at shipyards, but with outlets all over the project so that workmen need not, in fact cannot, miss the broadcast. The address system is used to "sell" Americanism, bonds, safety and the importance of the construction job. Top members of the construction forces and visiting dignitaries make recordings that are put on address system at various times to workmen on all shifts.

Kentucky Dam

Tva's greatest flood control dam, second largest structure in co volume, has reached final closure pool-raising stage. The 184 mile reservoir, extending across mo Kentucky and Tennessee to Pick Dam, has a capacity of 4,100,00 of usable storage, said to be suffi alone to reduce flood heights at C Ill., by 2 ft. Use of the full pool c city must await completion of rail relocation sometime next spring. *ENR* Aug. 31 1944, vol. p. 251).

Second-hand equipment

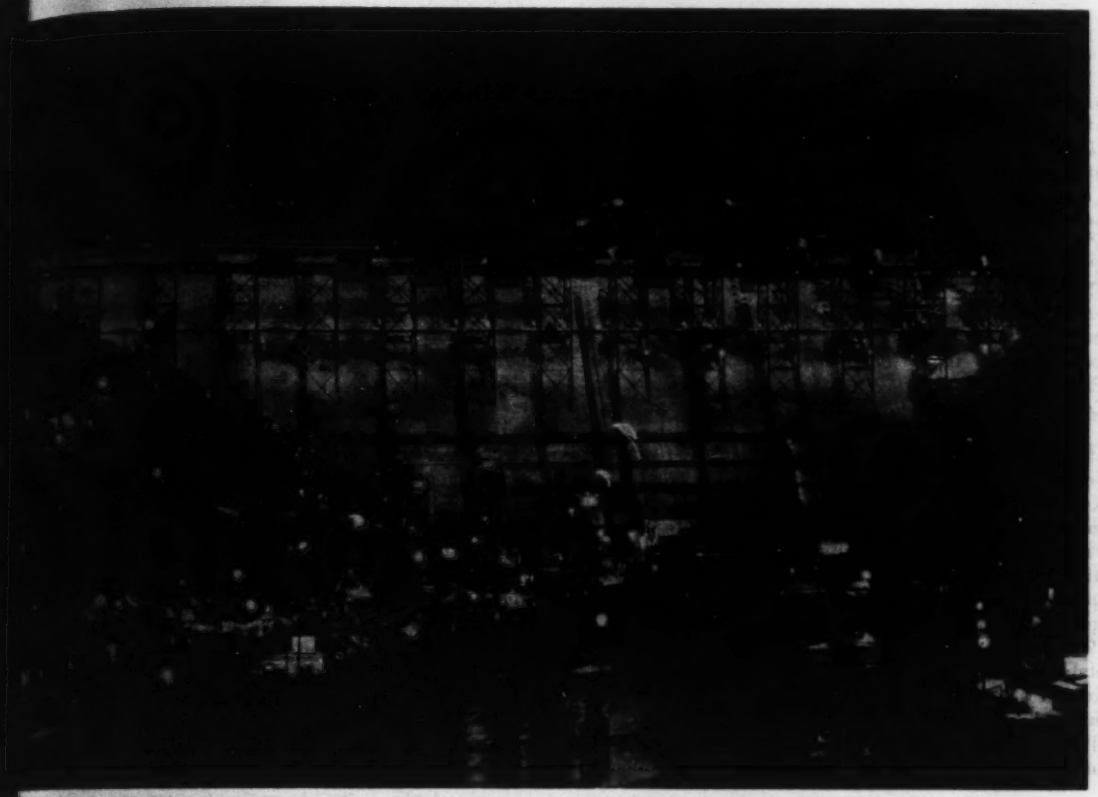
The Construction Plant Divisio the Tennessee Valley Authority is i second-hand equipment business. U direction of R. T. Colburn it is disp of $8 million worth of used constru equipment at a rate of $1 milli month. Some $4 million worth of e ment will be retained for possible f work. Prices are good, sales brisk

In some cases ceiling prices, b on a percentage of cost new in are higher than cost of the equip when it was purchased in the mid ties, so TVA is getting almost first for some long-lived, well-maint machines. Small pieces are mo rapidly, some larger units are going storage. Government and war tracts have preference; foreign c tries are buying under approval o War Production Board.

Incidentally, the Construction Division of TVA, which has desi the plants for construction and s vised the purchase of all of the struction machines for the various c is getting a big hand for the work i done. The scheme of doing the m construction plant planning for all projects at a central point has wo out to the satisfaction of even t who were opposed to the idea wh was started in the early days of T Capable designers, familiar with equipment owned by the TVA, and as familiar with the entire constru equipment market, were able to giv individual job the advantage of spe ist help. Perhaps most importan all was the fact that the constru plant division was made up mos engineers, who had previously wo with contractors and understood necessity for giving the "job" the of plant they wanted but with de worked out for most rapid opera

Municipal affairs

A building code for the city of K ville, compiled by the Technical So



Concrete placed only at night on TVA's Fontana Dam

...ana Dam, built by the Tennessee Valley Authority in western North Carolina, reaches completion as mass concrete ...s roadway level in several blocks. This ...d night view shows only one of the ...mmerhead cranes used in the concrete ...g operations. One had been dismantled ...e the picture was made, and the other ...ave been taken down since, indicating the ...d of the project. Concrete is now being placed only on the night shifts to make the remaining cranes available for other work in daylight.

The dam, largest east of the Rockies and fourth highest in the world, will contain 2,800,000 cu. yd. of concrete and will be more than 470 ft. high above foundation rock. The hammerhead and whirley cranes are operating on what is known as the high-level trestle. The same trestle was used at midheight of the dam for the first stage.

Closure of the low-level outlets and start of filling of the reservoir is scheduled for Nov. 1. Two 91,500-hp., 75,000-kva. units are being installed initially with space provided for a third unit. Design and construction is being done by TVA's own forces. F. C. Schlemmer is project manager; Oren Reed, construction engineer and G. E. Murphey, construction superintendent.

...oxville and the local chapters of ...merican Institute of Architects and ...ssociated General Contractors of ...ica, is now in the hands of the ...er. The revised code provides for ...of newly developed materials and ...porates a procedure by which ma... may be submitted for approval ... subsequent use as they become ...able in the postwar period.

...oxville has plans for a new water... highway along the Tennessee ... to be built possibly on a covered ...e fill. It is believed that the direct ... objection can be taken care of ...mediate cover, but the possibility ...er pollution from hydrogen sul..., generated from surface water ...ing through the refuse, will require ... study.

...llution of the Tennessee River is a ...us problem. About 600,000 people ...along the Tennessee, but sewage treatment, of any sort, is provided for only 40,000. Industrial waste, with a population equivalent of 1,300,000 people, is dumped into the stream. Much of it is from pulp and rayon manufacture and is difficult and expensive to treat. TVA is cooperating with city and state health departments and with manufacturers to find ways and means of reducing pollution.

TVA on the march

Resale of electricity under TVA established rates has proved profitable to both the cooperatives and the municipalities that purchase TVA generated power. As postwar projects, several of the quasi-public organizations contemplate extensions of rural lines and construction of new buildings out of surplus. Some of the organizations that have been distributing TVA power the longest have reduced their residential electric rates to well below the TVA basic rate—100 kwh. at 2c, the next 250 kwh. 1c, and the next 700 at 0.4c. This makes the first 1,050 kwh. 0.73c and all in excess of this is 0.7c. per kw. Basic TVA rates start at 3c and reach a minimum of 0.75c per kwh.

Reflecting the interest of the world in the TVA experiment, negotiations are underway for translation of Chairman Lillienthal's book *Democracy on the March* into Italian, Portuguese, Hebrew and Chinese; a low cost edition is being printed in England, and orders for 1,000 copies at a time of the U. S. edition come from Australia. The Tennessee Valley Authority constantly is host to foreign engineers studying water utilization and regional development and a few engineers from China are spending several months in the Valley, studying all phases of the design and construction.—*H. W. H.*

News of the Engineering Schools

Frederic T. Mavis has been appointed professor and head of the department of civil engineering at Carnegie Institute of Technology, Pittsburgh, Pa., to succeed Prof. F. M. McCullough, who has retired. Mr. Mavis has held a similar position at the Pennsylvania State College since 1939.

His graduation from the University of Illinois in 1922 was followed by a period of professional practice with Kelker, DeLeuw and Co., consulting engineers in Chicago. Awarded the John R. Freeman traveling fellowship of the American Society of Civil Engineers, he spent the year 1927-1928 in Europe studying hydraulic engineering. From 1928 to 1939 he was on the staff of the State University of Iowa, serving some time as associate director in charge of the laboratory of the Iowa Institute of Hydraulic Research and as professor and head of the department of mechanics and hydraulics. Mr. Mavis has written and edited numerous papers and monographs in hydraulics, hydrology, and structural engineering.

An effort to formulate a description of the ideal engineering school graduate—as an engineer and as a citizen—for use as a basic guide in attacking the problems of postwar engineering education is being made at the Cooper Union School of Engineering, New York, it is announced by Dean George F. Bateman.

A faculty committee under the chairmanship of Louis M. Heil has been appointed to make a comprehensive study of the type of engineer the institution should endeavor to produce. This committee will consider not only the student's training in engineering, but also his ability to take his proper place after graduation as a valuable member of society.

The committee hopes, Dean Bateman said, to prepare a set of "specifications" which will describe the graduate in terms of all types of educational experience, rather than in academic requirements alone.

The project has been undertaken the belief that too many specialized jects have found their way into the ventional engineering school progr leaving too little room for neces foundational subjects.

H. G. Baity is expected to arrive f Brazil this week to resume his du as head of the sanitary engineering department of the Graduate School of Public Health, University of North Carolina. Dr. Baity has been on leave of absence from his post for almost two years, during which he has been serving as chief engineer associate chief of party in Brazil the health and sanitation division of Office of the Coordinator of In American Affairs.

In Brazil Dr. Baity has his headqu ters in Rio de Janeiro, but he sp much of his time in the field direct the installation of sanitation facili and construction of health centers some remote parts of the country.

Restrictions relaxed on house remodeling

For the first time since the War Production Board clamped wartime restrictions on construction, that body will now permit one type of construction, in designated areas—which need not be war industry areas—without limit as to extent of work or dollar value. The new ruling covers remodeling and conversion of large apartment and dwellings to provide more small housing units in areas where the National Housing Agency finds an extreme housing shortage exists.

New York City is the first to be so designated, and it already has conversion applications on file with NHA. Despite that city's loss of wartime population, an acute shortage of middle-rent apartments is said to exist. This shortage could not be met under WPB restrictions, because the need was not for war workers.

Washington, D. C. is expected to be the second city to be named. NHA officials will make no estimate of how many areas will prove to be eligible for the unlimited conversion program, the number of buildings or units affected, nor the dollar value of the remodeling. They do say, however, that many thousands of new units may result.

Before an area can be designated as having an extreme housing shortage, it must be cleared with the Areas Production Urgency Committee of WPB. Thereafter, individual applications to remodel must be made on WPB Form 2896 and filed with the nearest FHA office. Approval of the application carries with it an AA3 priority rating, which WPB holds is in general sufficient for most materials required. Rents for the new units will have to be approved by the Office of Price Administration. The new program is designated H-3, under which housing heretofore has been permitted only to relieve individual cases of hardship.

Except in the areas approved by NHA, the provisions of WPB construction order L-41, limiting construction on a dwelling unit in any calendar year without WPB authorization to $200, and with a $1,000 limit for an apartment building to house six families, still apply.

Employment of ten additional engineers to assist in designing the water board's $20,000,000 postwar program was approved by the Detroit, Mich., city council, recently. The engineers are needed to expedite the planning now being done on parttime by most of the board's 53 regular engineers.

N. Y. City to spend $400 million in 1945

(Continued from page 67)

The last official barrier to wide-spr conversion of large New York ap ments and old tenements into ha needed living quarters was removed t week when Charles S. Ascher, regio head of the National Housing Agen designated the city as an area of "cr cal housing shortage."

Mr. Ascher's order embraced the city boroughs and Nassau County. followed by only a day the announ ment of the War Production Board t it would authorize resumption of modeling work by private owners, only in communities where the N decreed there was a pressing need additional housing (see report at le This was believed to be the first a in the nation so designated.

On a twelve-acre site in Har overlooking the Harlem River. Metropolitan Life Insurance Co. planning to erect a modern residen community for 1,200 families. The n development is to be known as Riv ton.

No estimate of the cost was av able, but realty and building exp figured that the structural investm alone would amount to $5,000,000.

FWA survey shows lag in postwar works plans

(Continued from page 67)

the preparation of highway plans on 50-50 percent matching basis. State governments also indicated that much school and hospital construction is contemplated, while work being planned by large metropolitan areas includes numerous sewer, water and sanitation jobs. In small areas, schools ranked high in the type of work which is now being contemplated.

Data obtained as to available funds to carry out the proposed projects revealed that money is available or obtainable from local sources for one-fourth of the projects for which plans are completed. Replies indicated further that, for nearly another quarter of the projects, the probable source of funds would be taxes, service charges and licenses. Borrowing was anticipated in only a few cases. Many reports indicated that the source of funds was unknown or that the agency was hopeful of federal aid.

Legislation and funds needed

The failure of the cities of under 25,000 population to complete plans was explained, in the majority of cases, by the lack of either funds or legislative authority, or a combination of both. For example, 27 state governments and 53 cities of over 100,000 population are in this predicament. In only four states, namely, New York, California, Michigan and New Jersey, has legislation been passed to provide state funds to aid county and municipal governments on planning, says the report.

The Federal Works Agency, for which Maj. Gen. Philip B. Fleming is administrator, made the report for the special committee on postwar planning of the House of Representatives. This committee, known as the Colmer committee, requested the survey to better evaluate General Fleming's view that satisfactory financing methods for postwar planning must be made available to many local governmental bodies if they are to prepare plans.

General Fleming recommended to the committee a few months ago that a $200,000,000 planning fund should be provided by Congress for this work, some of the money to be spent as grants on a 50-50 matching basis, but the major proportion to be distributed as loans or advances, to be repaid when the work is constructed. After making a study of the findings of the survey completed last week, General Fleming still believes that a substantial federal fund is needed to increase the tempo of postwar planning to the rate desired in order to get the best results.

JOBS OF THE WEEK

RETAINING WALL, Michigan

Sunswick Corp., New York, N. Y., has been awarded a contract by U. S. Engineers, Detroit, Mich., for a retaining wall, at Sault Saint Marie lock at an estimated cost of $1,000,000.

BRIDGE, California

California State Division of Highways, Sacramento, Calif., received low bid of $727,858 for reconstructing a portion of existing bridge across the Sacramento River, at Rio Vista, from Lord & Bishop, and A. Teichert & Son., Inc., Sacramento, Calif.

RECYCLING PLANT, Katy, Tex.

Hudson Engineering Co., Houston, has been awarded a contract for the design and construction of a recycling plant addition for the Humble Oil & Refining Co., Houston, Tex. The estimated cost is $700,000.

STOREHOUSE, Williamsburg, Va.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for constructing storehouse, shed and storage building, at Naval Supply Depot, to Virginia Engineering Co., Inc., Newport News, Va., at $2,470,000.

BARRICADES, Merrimac, Wis.

Graham Paving & Construction Co., Chicago, Ill., was lowest bidder at $645,838 for barricade construction at Badger Ordance plant, for U. S. Engineers, Milwaukee. Mason & Hanger Co., New York, N. Y. is engineer and architect.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 181.

Low bids announced for Chicago filter plant

Low bids were received on Sept. 13 covering construction of the superstructures of the filtration and administration buildings at Chicago's South District filtration plant, according to W. W. DeBerard, city engineer. An attempt was made last July (*ENR*, July 20, vol. p. 62) to let a contract for this work, based on anticipated priorities of necessary materials, but no contract was awarded at that time due to the confusion among bids received covering the several alternate materials involved in the undertaking.

Priorities on all necessary materials now have been acquired and the work has been divided into four units to expedite the awarding of contracts. A total of 13 contractors, all from the Chicago area, submitted bids on the various divisions of the work, the largest of which includes reinforced concrete and masonry construction, ventilation, and electrical and architectural work. The three low bidders for this work are: S. N. Nielsen Co., $1,497,000; Gust A. Newberg Construction Co., $1,528,700 and W. E. O'Neil Construction Co., $1,534,590. Low bids of $82,120 were submitted by Robt. Gordon covering heating facilities and equipment, and $13,250 for piping. W. T. Mahoney & Sons' bid of $49,600 was low for the plumbing, sewers and drains.

Hays in Palestine on irrigation surveys

James B. Hays is now in Palestine in connection with proposed work on irrigation and flood control projects in that country. The work is under the direction of a privately-financed group known as the Commission on Palestine Surveys (*ENR* May 25, 1944, p. 772).

Some 900,000 ac. ft. of storage is proposed at three main dams with 450 miles of principal feeder canals. At present Palestine depends on dry farming. It is said that three times the present population of 1,500,000 can be supported in the country under the proposed irrigation plan.

Mr. Hays will investigate the proposed dam sites and make preliminary studies and plans in cooperation with engineers in Palestine. He has been with the Commission on Palestine Surveys for more than a year, working in this country on advance planning. Hays formerly was construction engineer for the Tennessee Valley Authority at Chickamauga and Kentucky dams and before that was with the Bureau of Reclamation on irrigation work.

OBITUARY

Edward H. Heinneman, assistant to the regional director for the Bureau of Reclamation at Amarillo, Texas, died Sept. 10. Mr. Heinneman, a graduate of the University of Denver, had worked on the Boulder Dam, on the Central Valley project, and in Washington, D. C.

Mark L. Reed, Jr., 40, Asheville, N. C., contractor, died Sept. 6. President and treasurer of Reed and Abee, Inc., contractors, Reed was widely known for office buildings he had constructed throughout North Carolina.

John P. Cullen, 77, a leading general contractor in Wisconsin died Sept. 4 at Janesville. He had many large contracts in Wisconsin, Indiana, Iowa, North and South Dakota, Nebraska, Illinois, and Florida. He served two years as president of the Wisconsin Constructors, Inc., and two terms as president and later director of the Wisconsin chapter of the Associated General Contractors of America.

James Page, 79, a retired consulting engineer at one time connected with the Port of New York Authority, died in Baltimore, Md., Sept. 11. After his graduation from Johns Hopkins in 1882 Mr. Page took special courses at Massachusetts Institute of Technology. He prepared publications for the United States Hydrographic Office, 1893-1905; was chief of the division of ocean meteorology of the United States Weather Bureau, 1907-08; and chief engineer of the water supply and sewer system of Cienfuegos, Cuba, 1908-12.

Payton M. Marshall, 55, Houston, Tex., contractor since 1905, died at Houston, August 31. He built and remodeled many Houston buildings.

• • •

Big new naval hospital for San Francisco area

Plans for the early postwar construction of a $6,500,000 permanent hospital in the San Francisco Bay area were announced recently by Twelfth Naval District headquarters in San Francisco.

The hospital will be a 1,000-bed, fireproof concrete or brick structure comprising 12 main buildings and six subsidiary buildings, and will require a 100-acre site. Naval authorities said the hospital probably will be located on the west side of the bay in proximity to the U. S. Naval drydocks at Hunter's Point.

A.S.C.E. field secretary named on Pacific coast

H. L. Thackwell of Pasadena, Calif., has been named field secretary for the American Society of Civil Engineers to serve the eleven Western states and Texas. For the present Mr. Thackwell will make his headquarters in Pasadena.

Appointment of a field secretary who would be resident on the Pacific Coast was authorized by the Board of Direction of the society some months ago in order to give the members in that region closer contact with the secretarial staff, and to make available to the local sections and student chapters the services of a member of the staff on questions arising in connection with matters in which the society is currently interested, such as collective bargaining.

Mr. Thackwell has been in engineering work in the Southwest and Latin America for the past 30 years, specializing largely in sanitary engineering.

MEETINGS

National

AMERICAN PUBLIC WORKS ASSOCIATION, annual congress, Hotel St. Paul, St. Paul, Minn., Sept. 24-27.

INSTITUTE OF TRAFFIC ENGINEERS, 15th annual meeting, Sherman Hotel, Chicago, Ill., Oct. 1-4.

AMERICAN PUBLIC HEALTH ASSOCIATION, second wartime public health conference and 73rd annual business meeting, Hotel Pennsylvania, New York, N. Y., Oct. 3-5.

FEDERATION OF SEWAGE WORKS ASSOCIATION, annual meeting, William Penn Hotel, Pittsburgh, Pa., in conjunction with 17th annual conference of the PENNSYLVANIA SEWAGE WORKS ASSOCIATION, Oct. 12-14.

INTERNATIONAL CITY MANAGERS' ASSOCIATION, annual conference, Medinah Club, Chicago, Ill., Oct. 12-17.

AMERICAN WELDING SOCIETY, 25th annual meeting, Hotel Cleveland, Cleveland, Ohio, Oct. 16-19.

SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS, fall meeting, Carter Hotel, Cleveland, Ohio, Oct. 17-20.

ENGINEERS' COUNCIL FOR PROFESSIONAL DEVELOPMENT, 12th annual meeting, 29 West 39th St., New York, N. Y., Oct. 20-21.

AMERICAN MUNICIPAL ASSOCIATION, annual conference, Hotel Blackstone, Chicago, Ill., Oct. 25-27.

NATIONAL COUNCIL OF STATE BOARDS OF ENGINEERING EXAMINERS, annual meeting, Hotel Lafayette, Lexington, Ky., Oct. 30-31.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, annual meeting, Atlantic City, N. J., Oct. 31-Nov. 2.

HIGHWAY RESEARCH BOARD, annual meeting, Netherlands Plaza Hotel, Cincinnati, Ohio, Nov. 22-25.

Regional and Local

NORTH CAROLINA LEAGUE OF MUNICIPALITIES, 36th annual conference, Winston-Salem, N. C., Oct. 4-6.

GEORGIA WATER AND SEWAGE ASSOCIATION, 13th annual meeting, Georgia Institute of Technology, Atlanta, Ga., Oct. 5-7.

SOUTHWEST SECTION, AMERICAN WATER WORKS ASSOCIATION, Stephen F. Austin and Driskill Hotels, Austin, Texas, Oct. 17-19.

MISSOURI VALLEY SECTION, AMERICAN WATER WORKS ASSOCIATION, Hotel President, Kansas City, Mo., Oct. 23-24.

CALIFORNIA SECTION, AMERICAN WATER WORKS ASSOCIATION, annual meeting, Hotel Biltmore, Los Angeles, Calif., Oct. 24-26.

WEST VIRGINIA SECTION, AMERICAN WATER WORKS ASSOCIATION, annual meeting, Hotel Chancellor, Parkersburg, W. Va., Oct. 26-27.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA, 5th annual water conference, William Penn Hotel, Pittsburgh, Pa., Oct. 30-31.

CAROLINA BRANCH, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, 24th annual meeting, Carolina Hotel, Southern Pines, N. C., Oct. 30-31.

WEEKLY CONSTRUCTION SUMMARY

CONTRACTS

Continental U. S. Only
(Thousands of Dollars)

	Week Ending Sept. 28 1943	Sept. 14 1944	Sept. 21 1944
Federal	$54,094	$27,436	$9,883
State & Municipal	8,366	8,041	4,955
Total public	$62,460	$35,477	$14,838
Total private	9,491	6,993	4,397
TOTAL	$71,951	$42,470	$19,235
Cumulative 1944	(38 weeks)		$1,848,716
1943	(38 weeks)		$2,437,651

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	1943 38 Weeks	Cumulative 1944 38 Weeks
NON-FEDERAL	$276,461	$346,555
Corp. Securities	17,408	96,045
State & Mun.	98,920	109,720
RFC Loans	9,040	57,790
FPHA Loans	8,133	...
REA Loans	20,000	20,000
Fed.-Aid Hwy.	128,000	63,000
FEDERAL	$2,753,838	$1,263,800
TOTAL CAPITAL	$3,030,299	$1,610,355

ENR INDEX NUMBERS

Index base=100		1913	1926
Construction Cost	Sept. '44	300.46	144.48
Building Cost	Sept. '44	236.00	127.87
Volume	Aug. '44	121.	53.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Moment Balancing

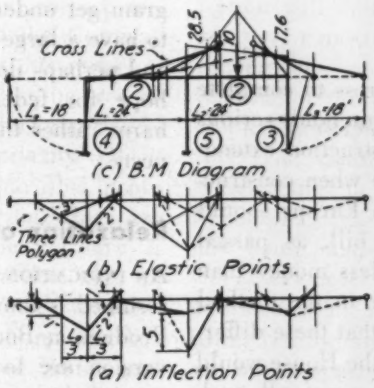
Sir: In the paper "Moment Distribution by Linked Rigidities", (*ENR* June 1, 1944, vol. p. 802), D. B. Steinman has shown a most interesting graphical method for moment distribution. However, a greater speed in distribution of moments may be obtained with the graphics termed "three line polygons" and "cross lines", as illustrated in the accompanying sketch.

The inflection points on the member axis are determined with line 2 drawn through the stiffness ordinate at the support and one-half basic stiffness at the third point of span, sketch (a). The stiffness ordinate at the support represents the stiffness of support as determined with line 1 drawn through the inflection point at the far end and one-half basic stiffness at the third point of the span. The basic stiffness is the ratio of the moment of inertia to the span length, I/L. The basic stiffnesses are shown in the circles sketch (c).

The elastic points on the member axis are determined with "three-line polygons", sketch (b). Line 2 in sketch (b) is the same as that shown in sketch (a). Line 1 is drawn through the inflection point at the far end and the stiffness ordinate at the support. Line 3 is drawn through the intersection point of line 1 with the vertical at the third point of the span and one-half basic stiffness at the third point in the following span. The intersection point of line 3 with the member axis is the elastic point.

The closing line in the moment diagram in sketch (c) is drawn through the closing points on the inflection point verticals determined with the "cross lines". The cross lines are constructed on the central moment ordinates. The inflection points and the central moments in the haunched beams are determined with constants given in the booklet entitled, "Analysis of Continuous Frames by Graphical Distribution of Moments", published by the writer.

Distribution of moments in the accompanying sketch is entirely graphical, and the procedures are not increased in geometric proportion to the number of spans.



A. A. EREMIN,
Associate Bridge Engineer, California State Highways, Sacramento, California

Air in Concrete

Sir: The editorial "Toward More Durable Concrete" (*ENR*. Aug. 24, 1944 vol. p. 213) contains the statements quoted below which appear to the writer to be an example of the confused comprehension of air-entrainment in concrete:

"If strength is not to be seriously affected air should not greatly exceed 3 percent; in other words unit weights should not be reduced more than from 148 to about 143 lb. per cu. ft. And where it is important to avoid loss of strength the mix should be redesigned by reducing both sand and water content by about the volume of the added air, thus in effect reducing the water-cement ratio."

It is important in discussions of the air content of concrete to distinguish clearly between air-content, per se, and what is referred to as "added air" in the editorial. Concrete made with plain cement may contain air in amounts varying from slightly less than 1 percent to as much as 3 percent. Generally, the air content of concrete, having a normal cement content, is between 1.5 and 2 per cent. Therefore, it would be an inadequate use of the potentialities of air-entraining cement to require that "air should not greatly exceed 3 per cent". Actually, it has been concluded by most investigators that the *added* air need not greatly exceed 3 per cent to realize the potential advantages of this type of cement. This would bring the total air content close to 5 per cent.

In this connection, attention is invited to the statement in Appendix 1 to the Annual Report of A.S.T.M. Committee C-1 on Cement for 1944 (preprint No. 41, p. 70) that "extensive field experience and laboratory tests have shown that an air content in concrete of 5 to 6 per cent is the optimum for obtaining maximum workability, bleeding reduction, and durability with a minimum of strength reduction". That statement was written by this writer with the firm belief in the old axiom that one cannot have his cake and eat it, too. Strength need not be sacrificed greatly, if at all, but the object in using air-entraining cement is to obtain the properties peculiar to its use. If strength of test specimens is of greater importance, plain cement should be used.

Issue is taken, too, with the use of the word "re-design" with regard to mixtures containing air-entraining cement. All concrete mixtures should be *designed* with the materials to be used on the project, including the particular brand and type of cement whether or not "loss of strength" is to be avoided. It is true and important that air-entraining cement mixtures will possess appreciably lower sand and water contents if properly designed in optimum proportions than would mixtures of similar workabliity containing a similar amount of plain cement, but this is not accomplished by "re-design".

Your very truly,

CHARLES E. WUERPEL,
Engineer-in-Charge U. S. Central Concrete Laboratory, Corps of Engineers, Mt. Vernon, N. Y.

EDITOR'S NOTE—The air referred to in the editorial was "added air" as the reference to reduction of unit weight shows. It would have been better to have said so more definitely. "Re-design" is probably what everyone will do the first time he uses the new cements, but Mr. Wuerpel is right in insisting on explicit terminology.

EDITORIALS

VOLUME 133 NUMBER 12

September 21, 1944

Compromise Needed

THE CONTINUED FAILURE of Congress to complete action on postwar highway legislation holds serious threat of set-back to highway construction extending many months beyond the time when construction can be resumed if the war in Europe should end soon. The amended Senate bill, as passed last week, now carries somewhat less money than the House bill, and the two differ in the method of apportionment. It would seem that these differences could be adjusted quickly if the House would act on its bill, but that body has put all such things aside until after election. If Congress, when it reconvenes, is preoccuped with war legislation or reconversion, there may be further weeks of delay, thus leaving the states in uncertainty at the time their own highway legislation should be in preparation. Responsibility for this condition is not entirely the fault of Congress. A considerable part rests with the state highway authorities for their failure to agree on what they would ask from Congress in the way of postwar highway legislation. All of which means state highway officials can help speed action by Congress by not being too insistent in demanding that their particular ideas be written into the final law.

Subsidies for Local Work

NEW YORK CITY, according to Mayor LaGuardia, has $400,000,000 of postwar work ready to put under contract in 1945 should the war end—provided the federal government will put up half the cost. From what has been said recently in Congress with respect to curtailment of non-war expenditures the prospect for federal aid, other than for highways and perhaps for low cost housing, appears remote indeed. More basically, however, local postwar construction, to be effective in quick relief of possible unemployment, should be independent of federal aid. Hence it seems unfortunate that New York, which has set such a splendid example in getting plans in shape for an early start, should take the lead in asking Congress for large grants, thus in effect passing control over its program to the federal government. Obviously, any community that asks for and accepts a large federal grant must also accept a large measure of federal control. That means another big PWA organization and all the delays inherent in remote control from Washington. New York has $150,000,000 of work, which can be put under way without a subsity. Better to have this really substantial program get under way without strings attached than to have a large program dominated by Washington and perhaps delayed by it. New York's expressed hope for federal aid, if pushed too hard, can harm rather than help postwar construction prospects.

Relaxation of Restrictions

AN INDICATION of how normal construction may be resumed is found in the announcement of the War Production Board that restrictions on house conversion are to be lifted in areas where there is a critical shortage of housing to permit the conversion of large houses and apartments into smaller units. A considerable amount of construction composed of many relatively small operations can be put under way in this manner, thus giving WPB a measure of the effect of such relaxation on war activities. Indeed it could go farther and permit other types of small jobs—culverts, water and sewer line extensions, street paving and the like—to go ahead. They require a minimum of transportation service and special material, and, moreover, can give employment quickly in a large number of widely-scattered communities. If no effect detrimental to the war effort develops, then further relaxation should be possible. The immediate result of such minor relaxation of restrictions on construction may not be apparent, but it will have the cumulative effect of getting more and more contractors back into action, thus facilitating a more rapid expansion of the larger jobs when the time comes to lift restrictions completely.

Transportation Trends

CONSTRUCTION OF A UNION TERMINAL for over-the-road freight trucks in New York City after the war, as proposed by the Port of New York Authority, is indicative of a trend in freight handling that should result in much more construction of a like nature in the postwar period. The Port Authority's new truck terminal is designed to save a large amount of cross hauling by trucking companies just as its big offrail freight terminal built several years ago was designed to reduce the unnecessary hauling of part loads from Man-

hattan to rail terminals in New Jersey. The Port Authority plans similiar union truck terminals in New York City and in adjacent New Jersey based on studies now being made. Like union truck facilities could be used to advantage in other cities.

Earthquake Lessons Repeated

THE PICTURE OF ROOF PARAPET and cornice masonry piled across the entrance to the Cornwall Ont., school, published last week in our report of the Sept. 5 earthquake, has a startling resemblance to those published following the Long Beach, Calif., quake of 1933. Such similarity is—or should be—disconcerting, and it can also prove fortuitous. That schools and other buildings are still being topped-out with unstable masonry is cause for anxiety, as is the realization that an earthquake sufficiently strong to throw down parapets, cornices and plaster in wholesale manner has occurred in the Northeastern United States and adjacent parts of Canada. The fortuitous element of the similarity to damage in the Long Beach quake (and to that incurred in 1925 at Santa Barbara, too, for that matter) is that an awakening respecting earthquake-proof design may ensue, similar to that which took place in California.

If design changes to make structures reasonably resistant to earthquakes were either extensive or expensive there would be more excuse for the existing situation. They are neither, however, and to anchor parapets and cornices sufficiently to resist the horizontal forces of the great majority of earthquakes involves not much more than should be done to take care of a reasonable wind load.

It is to be hoped that the extensive damage at Cornwall may cause Easterners to look with a little less complacency and self satisfaction on their "safer" location as compared to the West Coast, even though the record so far may favor that belief. Earthquakes "can happen here", and are happening every year. Someday one will occur when school is in session, and children will be crushed by falling masonry. Engineers and architects should not wait for such a tragedy to cast doubts upon their abilities.

Anchor parapets, or don't use them. Provide reasonable resistance to horizontal forces in foundations, frames, floors and walls. These are the lessons that all earthquakes have emphasized, and this latest one merely repeats them.

A Two-Fold Objective

PARTICIPATION of the United States government in the development of industrial and other resources of South America has given rise to frequent expressions of concern in this country. Principal cause of alarm is the belief that our financial loans and other aids directed toward foreign industrialization will destroy markets for many goods that are now exported from the United States. Quite conceivably, such ideas may be generated by a reading of the article on Peru's industrialization of the Chimbote Bay region (page 96). Further reflection, however, will reveal that the United States stands to gain by extending a helping hand to countries like Peru, where strenuous efforts are now being made to improve economic conditions.

For example, when Peru has completed its iron and steel plant it will be in a position to produce rails, reinforcing bars and cast iron pipe, which are now imported at high prices because of shipping charges. The dollar exchange thus freed should then be available for the purchase of more expensive steels and finished products whose dollar value is high in comparison to weight. Furthermore, production of heavy-tonnage iron products in Latin-American countries can hardly be considered a threat to our export business because in the past much of this was supplied by Europe anyway. Likewise, in connection with the development of hydroelectric power facilities, any aid that we contribute should result in almost immediate benefits to exporters of electrical equipment and certain types of consumer products.

Another, less tangible, benefit from promoting higher standards of living in South America, is the contribution that this will make in the establishment of more stable governments and future world peace. It is axiomatic that when the living standards of a people are being improved, the likelihood of dissatisfaction with the government that provides such benefits is largely eliminated. A final argument that favors our support of industrial developments in the countries south of the border may be drawn from our past experiences in foreign trade, viz., that our best customers are also our biggest competitors.

In many respects, the engineering and financial aid we may give to Peru might well be considered a selfish strengthening of our foreign markets as well as a contribution to hemispheric solidarity.

NGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor* Copyright, 1944, by McGraw-Hill Publishing Company, Inc.
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ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Steel-Paved Steps to Tokyo

H. W. Richardson
Western Editor, Engineering News-Record

***Contents in Brief**—The northern road to Tokyo follows the 2,000-mile sweeping curve of the Alaska Peninsula and the Aleutian Islands. Along this road the armed forces have built a series of airports on the barren Arctic tundra that form aerial stepping stones to the Nip homeland—steel-paved steps that are surfaced with steel plank mat. This steel paving has made fast construction of the airfields possible. As the task forces moved westward, island by island, each conquest brought new problems in runway construction. At Adak the field was built in a tidal swamp closed off from the sea by a sand dike; at Amchitka the strip was built under enemy bombing.*

FROM THE MAINLAND OF ALASKA, down the narrow curving length of the Alaska Peninsula and on out to the far end of the chain of bleak Aleutian Islands the armed forces are building a series of airports—a 2,000-mile military lifeline. The landing strips are hard surfaced as far westward as the middle of the peninsula. But from there on they are mostly steel mats—one of the war's miracle products—for they are being built in a hurry far from sources of materials and equipment.

These fields are an extension of the airport network in the interior of Alaska and the southeastern panhandle. They were started for the defense of the mainland, carried ahead for clearing the Japs out of the Aleutians, and now stand as steel-paved steps to Tokyo. Already the north end of the Nipponese empire at Paramushiro has been bombed from Aleutian bases.

Army, Navy and civilian job

Contractors, Navy Construction Battalions and Army Engineer troops have all participated in building the Alaska-Aleutian airport network. In the interior of Alaska and along the seacoast fringe of the mainland several fields were contractor-built for the Civil Aeronautics Authority as a peace-time operation. When Alaska became a vital defense zone the army engineers took over many of the CAA projects, improving some by contract, others by engineer troops. Then the army went ahead with other airports, again letting some by contract and building others with troops.

In August, 1940, with the start of defense construction in this country, the army engineers moved into Annette Island, near Ketchikan, Alaska, to build the first big air base for the protection of the Alaskan coastline. When this was completed, they moved further up the coast to Yakutat, on a similar project. Mud, deep, sticky, endless mud, soaked by the Alaskan coastal rains that total 180 in. per year, and churned up by scrapers and other dirt-moving equipment, proved to be the biggest difficulty in building these two bases. Eventually they were completed, with concrete-paved strips, and the engineers moved on westward.

Meanwhile, the Navy was at work on its three principal Alaskan bases —Sitka, Kodiak and Dutch Harbor. At first all the navy work in this territory was done by contract, but in the summer of 1942 the contracts were terminated and the work was taken over by the Seabees. Each naval base includes landing strips for both land-based and amphibious planes. In addition to the airports at the bases, the army built substantial supporting airfields nearby.

The supporting field for Dutch Harbor played an important part in thwarting the Jap attack on that base in June, 1942. Because of the ruggedness of Unalaska Island, upon which Dutch Harbor is located, the next island westward, Umnak, was selected as the site for the auxiliary army base.

Surprise for the Japs

Construction work at Umnak was kept secret, and at the time of the Jap attack on Dutch Harbor had been completed far enough to accommodate a fighter squadron. When the Japs struck with a superior force, land-based planes from Umnak came to the rescue. The Nips were so surprised to see planes attacking them from the west that, after getting in a few damaging blows, their fleet turned tail and ran westward, finally landing forces at the unoccupied island of Kiska, Aggatu and Attu at the far end of the Aleutions. It took us 15 months to clear the enemy off these last islands.

As part of the air route from the mainland to the islands the army built three substantial fields at Naknek, Port Heiden and Cold Bay along the north side of the long Alaska peninsula. Some of the engineer troops that slashed the pioneer road of the Alaska Highway through the wilderness participated in the construction of these facilities.

From Umnak we continued to move eastward with the Aleutian defense. The next stop, Aug. 31, 1942, was at Adak, destined to become the center of Aleutian activities. A month later we dropped back to Atka to build an intermediate airport. On Jan. 12, 1943, the first major move to drive the enemy off the islands was made by a landing at Amchitka Island, only 57 miles southeast of Jap-held Kiska. Either the Adak and Amchitka strips were completed planes for these bases systematically bombed Kiska and Attu. Our successful invasion of Attu started May 11, 1943 (*ENR* Dec. 30, 1943, vol. p. 492). The taking of Attu and completion of an airport there permitted our forces to squeeze Kiska from two directions. Such pressure became too hot for the Japs on Kiska, and they evacuated the island a few days prior to our invasion on Aug. 15, 1943, bringing to a close the efforts to clear the enemy from the Aleutians. So much for a brief resume of the tactical operations.

The north road to Tokyo follows the Alaska Peninsula and the curving chain of the Aleutian Islands. The Jap base at Paramushiro has been bombed.

Pierced plank paving

The Seabees helped build the Umnak airport, and are working with the army on a landing field at Attu, to be used jointly by the army and navy. Elsewhere in the western Aleutians the airports are being built by army engineer troops.

One material alone made possible the fast construction of these outpost airports—steel mat surfacing. Several types of steel mat have been developed but that known as pierced plank has been found most suitable for Aleutian conditions. This type consists of steel sheets about ¼ in. thick, 16 in. wide and 10 ft. long, pierced by three rows of cupped holes 3 in. in diameter, stiffened with two longitudinal ribs pressed into the plate, and fringed with a series of slots and bayonet hooks, the latter bent downward at a 45-deg. angle. These hooks engage the slots of adjacent sheets when over lapped about 1 in., forming a tight, smooth interlocked steel mat that is substantial and durable, well liked by the pilots because of its smoothness and because they can make belly landings on the mat in emergencies with a good chance of walking away from the disabled ship.

The sheets weigh 65 lb. apiece, (easily handled by two men) or 5.2 lb. per sq. ft. in place on the field. Usually the mat is laid on a sand base, for on most of the islands is found a fringe of dunes of volcanic sand which supply this needed material. In general, the sheets are laid transverse to the long axis of the runway with joints staggered. Staggering the joints leaves alternate rows of sheets either 5 ft. too long or two short. Usually each shipment includes a number of half-length sheets to fill

Steel plank runway surfacing is laid in fast time by experienced engineer troops using only simple tools.

Timber tide gate keeps out the sea at high tide, drains off the dike-enclosed field at low tide for an unusual airport on Adak.

Water within the dike-enclosed field is kept under control by three pumps like this one, powered by diesel engines.

in at the ends to make a straight line edge on both sides, but sometimes the short sheets are not available. The ragged edges invite wind erosion of the sand when the base material is unusually fine, so in some cases end filler sheets are made by cutting standard lengths in half with arc welders.

The sheets are overlapped in two different ways. One, known as the Venetian blind system, is to lay one edge on top of one adjoining sheet and under the sheet on the other side. The second method, called "over-and-under" is to lay alternating rows on top of both adjoining rows. Experience proved the best method is to lay the ends of the runways, where planes land and take off, and traffic is predominantly in one direction, by the Venetian blind system with the high side toward midfield, and to lay the center section over-and-under for two way traffic. After the bayonet hooks are inserted into the slots of the adjacent sheets the newly-laid steel plank is shoved endwise to fully engage the hooks. Two spring clips are then pounded into two slots in each sheet to keep the hooks from backing out.

At one runway the Air Corps requested the sheets be laid longitudinally with the idea that perhaps the surfacing would be smoother for small planes. However, the big bombers caused the sheets laid in this manner to warp and buckle, so it was necessary to tear up the runway and relay the plank transversely, after which no further trouble was experienced.

The sand base, built with scrapers and bulldozers, is leveled off by dragging with scrapers when the material is dry, by road graders when wet, followed in each case by dragging with timbers pulled by tractors. Final finishing, just ahead of laying the steel sheets, is by hand shovels and rakes. After laying, the holes in the steel plank are filled in by spreading sand over the mat with hand shovels. Excess sand on the surface soon works down through the steel to fill up local low spots or blows away. A transverse crown of 1½ percent is carried from the edges toward the center of the strip. Experience has shown that the sand subgrade when graded on straight slopes to an apex at center of runway settles into a desired curved crown within a few days under traffic.

Umnak alone proved the worth of steel mat surfacing even if another field had never been built in the Aleutians. When the Japs were threatening to invade Alaska and the islands in 1942 the engineers were working fast to get the airfield at this site completed for the protection of Dutch Harbor. Time was short, so instead of grading up the usual sand base the engineers laid the pierced plank mat directly on the tundra, that grass-covered swampy ground that covers all of the Aleutians. Their judgment and speed paid off in big dividends, for within a few days after enough mat had been laid to form a suitable landing strip for a fighter squadron the Japs attacked Dutch Harbor. One Umnak-based squadron took off from the steel-paved swamp and went to work on the invading fleet. Taking advantage, as always, of local materials whenever possible, the Army Engineers used a mountain of volcanic cinders at Umnak for surfacing the permanent airport on that island.

Airport built in tidal swamp

At Adak, about two-thirds of the way out in the Aleutian chain, of islands, one of the most amazing airports in the world was built with remarkable speed. Our troops made an amphibious landing on Adak at Sweeper Cove at the south end of Kulak Bay on Aug. 31, 1942. As